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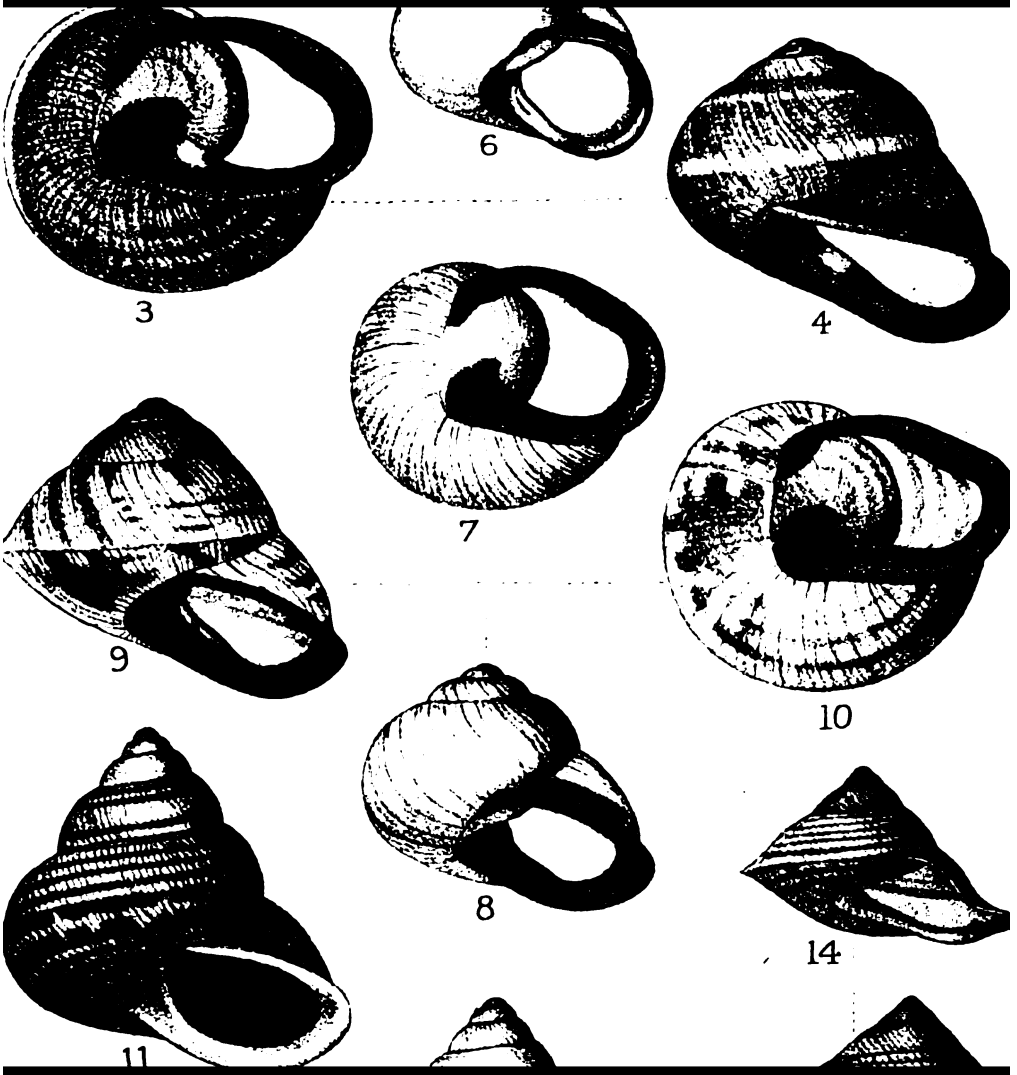

Manual of conchology, structural and systematic

George Washington Tryon, Henry Augustus Pilsbry, Alpheus Hyatt, Charles Montague Cooke

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MANUAL

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WITH ILLUSTRATIONS OF THE SPECIES.

BY GEORGE W. TRYON, JR.

CONTINUATION BY

H. A. PILSBRY,

CONSERVATOR OF THE CONCHOLOGICAL SECTION OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

Part.....

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Vol. VII.

HELICIDÆ, Vol. V.

PHILADELPHIA:

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MANUAL OF CONCHOLOGY.

FAMILY *HELICIDÆ*, Vol. V.

Genus HELIX, Linné, (Concluded.)

Sub-genus PAPUINA Martens.

Geotrochus BECK, (in part) Index p. 47, 1837, *not of* v. HASSELT, Algemeene Konst-en-letterbode voor het jaar 1823, p. 233; see also, Bull. des Sci. Naturelles et de Géol. iii, Paris, 1824, p. 83, paragraph 9; and also, Ostas. Zool., Landschn. p. 245.—*Geotrochus* of authors generally.—*Papuina* v. MART., in Albers, Die Heliceen, 2d. Edit. p. 166, 1861. Type *H. lituus* Less.—*Eugenia* ALBERS *Mss.*—*Insularia* TAPPARONE CANEFRI, Ann. Mus. Civ. di Storia Nat. di Genova, xix, p. 115, 138; 1883, type *H. lituus.*—*Pileolus* LESSON, Voy. de la Coquille, Zool. ii, p. 313, first species *H. tuffetii* Less., *H. gaberti* also included; (preoc).—*Cymotropis* v. MART., Die Hel. p. 169, type "*H. vitrea*"=*H. antrorsa* Pfr.,—*Merope* ALBERS, Die Heliceen, 2d edit. p. 158, type *H. fringilla* Pfr. (name preoc. in *Mactridæ*—*Acavus* of E. A. SMITH and TAPPARONE CANEFRI, *not Acavus* MONTF.

There can be no question that v. Hasselt's group *Geotrochus* was founded on species of *Trochomorpha* or *Trochonanina*. "Under the generic name *Geotrochus*, I group three little shells, agreeing with Trochus in form of the shell, but with Helix in the animal." The species *obtusus*, *turriculatus* and *zonatus* are enumerated by v. Hasselt. The absence of true *Papuina* in Java, and the abundance of *Trochonanina* at the localities visited by Hasselt, cause Dr. v. Martens to surmise that he had before him *Helix winteriana* and *conus* or allied species. Swainson and many others have used the name *Geotrochus* for *H. pileus* and allies, and it is an unfortunate circumstance that the change is necessary.

Shell turbinate or trochiform, imperforate or umbilicate, rounded at the periphery or carinated. Surface smooth or variously sculptured, not hirsute. Aperture oblique; peristome expanded.

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The species are illustrated on plates 1 to 17.

No exact diagnosis can be framed for a group in which such diverse forms occur as in *Papuina*. It is still, however, an easy matter to recognize a species as belonging here; for with all its variety, the group is a very natural one, well differentiated from other branches of the Helix stock. The central point for the subgenus, geographically, is New Guinea; the species extending eastward to the Louisiade, Admiralty and Solomon Islands, with a few in the New Hebrides, and northwestward into the Moluccas. The distribution is, therefore, practically the same as that of the subgenus *Chloritis* (+ *Planispira*, etc.)

In a previous volume the writer has separated the South American group *Oxychona* from *Papuina*. It remains to sunder the species of southeastern Asia and the zoologically dependent islands, which will be discussed after the true *Papuina*-species. The latter form a moderately homogeneous group, in which it is practically impossible to establish "sections" to correspond to the various names given in the above synonymy. It seems to me a better plan to form the species into a number of groups, each typified by its more prominent specific type. These groups are of somewhat unequal value, and bear various degrees of affinity to each other; but they undoubtedly form a basis for a natural system. It is likely that anatomical characters will afford a good clue to the minor groups.

I. *True* PAPUINA; *including species of the Moluccas, New Guinea, Australia, Admiralty, Solomon, Louisiade Is., etc.*

(1.) GROUP OF H. BOIVINI.

Imperforate, turbinate, the periphery rounded or bluntly angled; upper lip not expanded or but narrowly expanded; banded. *Surface smooth, lightly obliquely striatulate*, sometimes having faint spiral lines, but *no forward-descending wrinkles.*

H. CONGRUA Pfeiffer. Pl. 9, fig. 72.

Imperforate, trochiform, rather solid, striatulate, flesh-colored, variously painted with brown bands; spire subconcave-conic, apex a little obtuse. Whorls 6, a little convex, the last irregularly inflated, slightly descending, distinctly rib-striated; base nearly flat, more shining. Aperture oblique, subtetragonal-oval; peristome blackish-chestnut, expanded, encircled by a streak outside, margins

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joined by a blackish callus; the right margin dilated, columellar margin wide, complanate.

Alt. 24, greater diam. 29, lesser 25 mill. (*Pfr.*)

Admiralty Is.

H. congrua PFR., P. Z. S. 1858, p. 21, t. 40, f. 7; Mal. Bl. 1859 p. 14; Monogr. v. p. 269.

H. CHANCEI Cox. Pl. 14, fig. 70.

Shell imperforate, conoid, faintly striated from above downwards, with straight striæ, and longitudinally striated with more distinct wavy striæ, white, ornamented on the center of the whorls with a broad brown band, and around the base with a broad brown zone; spire pyramidal, black at the apex; whorls six, the last rapidly increasing in size and inflated, suddenly deflected in front, and contracted behind the lip; aperture large, irregularly ovately rounded, margins approaching, lip slightly thickened and reflected; collumellar margin moderately dilated and excavated, and darkened by a black callus. (*Cox.*)

Alt. 31, greater diam. 33, lesser 27 mill.

Ysabel, Solomon Is.

H. chancei Cox, P. Z. S. 1870, p. 171, t. 16, f. 5.

Resembles closely the following species in coloring, but is very differently proportioned.

H. AMPHIZONA Pilsbry. Pl. 8, figs. 52, 53, 54.

Imperforate; turbinate-conic, the spire elevated, apex obtuse; whorls 6½, the last rounded at the periphery, descending in front. Surface having light oblique growth-lines, and very close, fine, crenulated spiral striæ. Color creamy-white at suture and periphery, the base and a wide band above dark brown; earlier whorls purple-black.

This is a large solid shell; the spire is conical, whorls somewhat convex, the earlier three or four of a dark-reddish or purple-black color. The last whorl has no trace of a carina. The aperture is very oblique, banded inside; peristome well expanded, reflexed, the dark bands extending upon it half-way to the edge, the outer portion being white; the columella and parietal wall are dark brown. Columella wide, adnate, flat, its inner edge somewhat straightened, arcuate and deeply entering at the insertion.

Alt. 34 greater diam. 30, lesser 23 mill.

Alt. 32 greater diam. 29, lesser 23 mill.

Solomon Is.

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Like *H. chancei* in coloring, but so different in proportions that I do not feel justified in uniting them.

Differs from *H. pileus*, *H. lenta* and *H. euchroës* in being *imperforate at all stages of growth*, a young specimen before me having the slender axis completely solid. The specimens before me are three in number. They were presented to the Academy by John H. Campbell Esq., of Philadelphia. Figures 52, 53 represent a perfect specimen. The original of fig. 54 is somewhat worn, making the upper band appear more broken and narrower than it naturally is. I give the locality with much doubt, as I do not know the history of the specimens.

H. BOIVINI Petit. Pl. 6, figs. 13, 14, 15, 16, 19, 20.

Imperforate, turbinate, smooth, the periphery rounded; white, banded with blackish-brown; *lip edged with bright orange-red.*

The spire is conical, apex obtuse; whorls 6, slightly convex, the last rounded at the periphery, slightly descending in front. Surface striatulate, smooth, shining. Color white or cream, conspicuously banded with blackish-brown bands, of which one above and one below the periphery are most constant (there being also, usually, a band a short distance below the suture and one or several on the base). Aperture very oblique, banded within; peristome narrowly expanded, white, edged with intense orange. Columella sloping, straightened, flattened, dilated and closely appressed over the umbilical tract.

Alt. 27, greater diam. 25, lesser 22 mill.

Alt. 20, greater diam. 21 mill.

Bougainville and Ysabel, Solomon Group.

H. boivini PET., Rev. Zool. 1841, p. 184.—DESH., in Fér. Hist. t. 108C, f. 7, 8.—REEVE, f. 410.—PFR., Monogr. i, p. 230; Conchyl. Cab. p, 433, t. 151, f. 56.—v. MARTENS, Monatsber. k.-preuss. Akad. Wissensch. zu Berlin, 1877, p. 276, t. 2, f. 11–13 (anatomy).—BRAZIER, Journ. de Conchyl. 1880, p. 306.—*H. subrepta* HOMBR. & JACQ., Voy. au Pol Sud, Atlas, t. 4, f. 1–6.—*H. colorata* MOUSSON, *teste* PFR., Monogr. iii, p. 174.

Readily recognized by the brilliant orange edge of the narrowly reflexed lip, and the black bands. There are often some reddish-brown bands also; and some specimens have the greater part of the base of this color.

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H. AMBROSIA Angas. Pl. 4, figs. 75, 76, 77.

Imperforate, turbinate, rounded at the periphery, having a broad dark-brown band above (often split into two bands) which is maculated with angular patches of opaque white; base either unicolored deep brown or having a brown band below the periphery; lips white.

The spire is conical, apex whitish, obtuse; whorls 5½, slightly convex, the last a little descending in front. Surface smooth, shining, lightly striatulate. There is a narrow white border below the suture, a wide white girdle at the periphery, and usually the broad blackish-brown band on the upper surface is split into two by a white zone. The base is either unicolored blackish-brown, or is white shading into brown below a dark band. Aperture oblique, subrhombic, dark within; the face and reverse of the narrowly expanded lip are white. The columella is oblique, wide, subtruncate below.

Alt. 24, greater diam. 20, lesser 18½ mill.

Alt. 19, greater diam. 18, lesser 16 mill.

Galera ("*Sava*" *or* "*Russell's Id.*") *and Ysabel Is., Solomon Group.*

Geotrochus ambrosia ANGAS P. Z. S. 1867, p. 889, t. 43, f. 9, 10.—*Helix ambrosia* PFR. Monogr. vii, p. 210.—DOHRN, Conchyl. Cab. p. 571, t. 168, f. 12, 13.—BRAZIER, Journ. de Conchyl. 1880, p. 302.—*H. ramsdeni* ANGAS, P. Z. S. 1876, p. 266, t. 20, f. 6, 7.

The pellucid epidermis forms angular spots on the dark bands, as in many Philippine Island Cochlostylas.

The form called *H. ramsdeni* by Angas is slightly larger, but has no constant differences. The specimen before me (typical in form and color), measures, Alt. 25, greater diam. 24, lesser 20 mill.

On Pl. 16, fig. 19, represents Angas' type of *ramsdeni*, and fig. 16, the smallest specimen of *ambrosia* in the suite of sixteen specimens before me.

H. MALANTENSIS Angas. Pl. 16, figs. 17, 20, 21, 22.

Imperforate, elevated turbinate, the spire conical, apex obtuse; whorls 5½, slightly convex, the earlier 3 unicolored waxen-white, the last whorl rounded at the periphery, a trifle descending in front. Surface smooth, shining, lightly striatulate. Color creamy-white, variously zoned with wide and narrow bands of dark brown and tawny.

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Aperture oblique, subrhombic, banded within; lip slightly expanded, its face and reverse white; columella wide, flat, its inner edge slightly arcuate, scarcely truncate below.

Alt. 24, greater diam. 20½, lesser 18 mill.

Alt. 22, greater diam. 25, lesser 22 mill.

Malanta Is., Solomon Group.

H. malantensis ANGAS, P. Z. S. 1876, p. 488, t. 47, f. 1–3.

Closely allied to *H. ambrosia var. ramsdeni*, but lacking hydrophanous patches, and having a greater number of bands. It differs from *H. guadalcanarensis* in being somewhat more elevated, and not angled at the periphery. Figures 20, 21, 22 and the measurements last given above are from Angas. The other figure represents the shell before me, described above.

H. PHILOMELA Angas. Pl. 4, figs. 66, 67.

Shell imperforate, trochiform, moderately solid, obliquely obscurely striated; whitish, the whorls ornamented in the middle with a broad fascia composed of numerous purplish chocolate bands with a similar fascia below the periphery, and crossed obliquely with close narrow white lines corresponding with the lines of growth; spire conical, apex obtuse, purplish-black, whorls 6, moderately convex, sutures impressed, last whorl rather inflated descending in front, and contracted behind the aperture, base somewhat flattened; aperture subovate, very oblique, peristome thickened expanded and slightly reflected, the right margin a very little sinuated; columellar margin dilated, and furnished within with a prominent callus terminating abruptly within the aperture; the columella and the interior of the aperture dark chocolate-brown, the inner edge of the lip orange, and the reflected portion white, immediately behind which is a pigment-like black deposit on the whorl. (*Angas.*)

Alt. 20, greater diam. 25, lesser 20 mill.

Ysabel Island, Solomon Group.

H. philomela ANGAS, P. Z. S. 1872, p. 610, t. 42, f. 2, 3.

Differs from *H. guadalcanarensis* in the form of the columella.

The form figured by Angas is said by Cox to be the rarest variety of this species, and cannot be regarded as an ordinary representative. It is found abundantly at the Louisiade and Solomon Is.; and the prevailing color is white, with a dark black edge behind the reflexed lip. (See Cox, P. Z. S. 1873, p. 566, under *H. redempta.*)

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H. GUADALCANARENSIS Cox. Pl. 4, figs. 80, 81; pl. 16, figs. 23, 24.

Imperforate, globose-turbinate, the spire conical, apex obtuse, brownish-corneous; whorls 5, somewhat convex, the earlier 2 or 2½ unicolored, corneous; the last whorl distinctly and rather acutely angled in front, the angle becoming indistinct on the latter part of the whorl; toward the aperture the whorl usually descends a trifle. Surface lightly striatulate, shining. Color pale brown, having a wide white girdle at the periphery, and (typically) numerous narrow brown bands above, fewer below. Aperture very oblique, large, more or less distinctly banded inside; lip expanded, white; columella spreading at its insertion.

Alt. 22, greater diam. 23, lesser 20 mill.

Guadalcanar, Solomon Is.

H. guadalcanarensis Cox, P. Z. S. 1871, p. 645, t. 52, f. 8.—DOHRN, Contin. Conchyl. Cab., p. 586, t. 172, f. 12, 13.

The angular periphery, numerous narrow bands, and the dark streak just behind the expansion of the white lip are characteristic marks of this species. *H. philomela* Angas is evidently closely allied.

Variety (pl. 16, figs. 23, 24). A color-variety having narrow bands at axis and suture and broad bands above and below the peripheral white zone. Form typical.

Alt. 22, greater diam. 21, lesser 18 mill.

H. HARGREAVESI Angas. Pl. 4, figs. 72, 73, 74.

Imperforate, low-turbinate, spire conical, apex obtuse white; whorls 5–5½, slightly convex, the last rounded at the periphery, *abruptly descending in front*, but not descending as far as the basal band. Lightly marked by growth-lines, but smooth and polished. White, the lips and columella bordered with deep chestnut-brown, the base suffused with brown around the columella; and usually there is in addition a broad brown girdle on the periphery, a narrow brown border above and below the suture, and a basal stripe. There are some sparsely scattered, small, grayish dots, usually few in number and inconspicuous.

The aperture is very oblique, subrhombic, white and showing the band inside. The upper lip is not at all expanded; basal lips slightly expanded; columellar lip suddenly dilated, spreading in a

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dark callus over the excavated umbilical region; inner edge of the columella straightened, thickened, deeply entering.

Alt. 21, greater diam. 25, lesser 21½ mill.

Alt. 19, greater diam. 21, lesser 18 mill.

Bougainville, Faro and Shortland Is., Solomon Group.

H. hargreavesi ANG., P. Z. S. 1869, p. 625, t. 48, f. 2.—PFR. Mon. vii, p. 310.—SMITH, P. Z. S. 1885, p. 591.—"*H. Hargravesii Cox*," PAETEL, Catal., p. 90.

The broadly brown-bordered lip, polished surface destitute of anteriorly descending wrinkles, and the small sparsely scattered bluish-translucent dots, are the more prominent characters of the species. *H. gamelia* is closely allied, but it lacks the dark lip, and has the upper lip more arched forward; *H. hargreavesi* further differs from *H. gamelia* in having the last whorl abruptly and considerably deflexed in front.

H. GAMELIA Angas. Pl. 3, figs. 44, 45, 46, 47.

Imperforate, low-turbinate, thin; spire conical, apex light, obtuse; whorls 5½, slightly convex, the last either rounded or subangular at the periphery, *not descending in front;* surface smooth, lightly striatulate, color cream white, becoming light brown on the latter half of the body-whorl, white on the spire, encircled by a narrow dark brown band bordering the suture below, a wider band at the periphery, and another on the base midway between axis and periphery; all visible within the aperture. Aperture very oblique, subrhombic; lip white or light brown, the columella brown.

The lip is bordered behind by a light and then a dark streak. The upper lip is slightly expanded, notably arched forward, receding toward the outer angle of the mouth. The columellar lip is spread in a thin brown callus over the impressed umbilical region. The edge of the columella is thickened; it is not truncated at the base. Alt. 18½ greater diam. 21, lesser 17½ mill.

Stephen, Ysabel, Shortland and Treasury Islands, Solomon Group.

Geotrochus gamelia ANG., P. Z. S. 1867, p. 888, t. 43, f. 1–3.—*H. gamelia* PFR., Mon. vii, p. 313.—SMITH, P. Z. S. 1885, p. 591.

Thinner, less elevated than *H. hargreavesi*, differently colored, and having the last whorl not descending to the aperture.

H. BRODIEI Brazier. Pl. 6, fig. 9.

Shell imperforate, flatly conical, thin, shining, obliquely faintly and irregularly plicately striated; white, with a chalk-white band at

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the suture and periphery, and with a spiral band of dark brown at the base, somewhat diffused, with the white band at the periphery; keeled; rather blunt at the apex; whorls 5, nearly flat, the last convex at the base; aperture oblique, rhomboidally ovate; peristome dark brown, moderately thickened, margins approximating, the right slightly deflected, the columellar margin reflected and furnished with a straight callus. (*Brazier.*)

Alt. 14, greater diam. 16, lesser 13 mill.

Choiseul Island, Solomon Group.

H. brodiei BRAZ., P. Z. S. 1872, p. 20, t. 4, f. 6.—PFR., Mon. vii, p. 301.

Varieties of this species occur in which the dark brown band is occasionally found above the chalk-white one, and a brown band under the periphery. (*Braz.*)

H. DAMPIERI Angas. Pl. 5, fig. 88; pl. 16, fig. 18.

Shell imperforate, subglobose, conoid, light brown or fawn color, here and there minutely dotted with dark, gray specks with a broad white band around the middle of the penultimate whorl, and two upon the last, one above and the other below the middle, also a narrow white line revolving up the spire beneath the suture, and a dark brown zone surrounding the pale or yellowish umbilical region. Whorls 5, a little convex above, somewhat glossy, obliquely and very finely striated by the lines of growth; the last more or less concentrically striated beneath, shortly descending at the aperture, which is white within. Lip a little thickened, edged with reddish-brown, only slightly expanded on the right side, more dilated below, produced into a thin, transparent callosity over the umbilical region, united above to the upper extremity of the peristome. Columellar margin oblique, white or partly tinged with reddish-brown, thickened and terminating below within the edge of the lip. Alt. 19, greatest diam. 22, smallest 19 mill. (*Smith.*)

Louisiade Archipelago (Angas); *Choiseul Bay, Bougainville Straits* (Guppy.)

H. dampieri ANG., P. Z. S. 1869, p. 47, t. 2, f. 6.—PFR., Mon., vii, p. 310.—SMITH, P. Z. S. 1885, p. 592, t. 36, f. 5.

The specimens collected by Guppy and described by Smith are smaller than the types; they also have the peristome brown, and the basal band is darker (pl. 16, fig. 18).

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H. WALLERI Brazier. Pl. 6, figs. 11, 12.

Shell imperforate, depressedly trochiform, rather thin, obliquely, irregularly and obscurely striated; yellowish-white, with two dark chocolate bands, thickly crossed with white diaphanous zigzag markings encircling the last whorl, the uppermost band the broadest; spire obtusely conical, apex white; whorls 5, flatly convex, sutures impressed, last whorl descending in front, base a little tumid anteriorly; aperture oblique, subrhomboidal; peristome very slightly thickened and expanded, and but little reflexed, the right margin moderately sinuated; columellar margin somewhat flattened and dilated with a straight abrupt callus; the umbilical region and the inner edge of the lip with the reflected portion brown, immediately behind which is a band of pigment-like deposit of a brilliant orange color. (*Angas.*)

Alt. 13, greater diam. 22, lesser 18 mill.

Ysabel Island, Solomon Group.

H. brenchleyi ANGAS, P. Z. S. 1878, p. 861, t. 54, f. 7 (not *H. brenchleyi* Braz.).—*H.* (*Papuina*) *walleri* BRAZIER, Proc. Linn. Soc. N. S. Wales viii, p. 228, 1883.

Has the orange coloring of *H. boivini* behind the lip, but is more depressed, and otherwise different.

H. ALFREDI Cox. Pl. 6, figs. 7, 8.

Imperforate, depressed-globose, glabrous, shining, polished, blackish-brown, having two opaque-white bands, one at periphrey, the other below the suture. Spire wide-conic, whorls 5, slowly widening, nearly flat, the last shortly deflexed in front. Aperture semi-oval; peristome white, simple, shortly reflexed; columella dilated, appressed.

Alt. 0.85, greater diam. 0.93, lesser 0.82 inch. (*Cox.*)

Solomon Is.

H. alfredi COX, P. Z. S. 1871, p. 323, t. 34, f. 1, 1*a*.—PFR., Monogr., vii, p. 311.—*H. alfredi var. trichroa* MARTENS, Conchol. Mittheil. i, p. 5, t. 2, f. 8–10; 1880.

A polished blackish-brown shell, with strongly contrasting bands of opaque-white at suture and circumference.

Var. TRICHROA Martens. Pl. 6, figs. 4, 5, 6.

Imperforate, rotund-conoidal, subtly striatulate, shining, tawny, the periphery whitish, bordered above and below with black; sutural

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zonule white. Spire conic, apex submamillate; whorls 5, a little convex, separated by moderately impressed sutures, the last whorl rounded at the periphery, flattened beneath. Aperture rhombic-semi-ovate, very oblique; peristome a little thickened, white, upper margin straight, arched forward; the lower margin shortly expanded; columellar margin straightened, very oblique, *attenuated* at the insertion.

Alt. 20, greater diam. 28, lesser 22 mill. (*Mart.*)

New Ireland.

H. MACFARLANEI Cox. *Unfigured.*

Shell imperforate, thin, globosely conical, smooth, white, ornamented with one broad black band encircling the last whorl at the middle, and a broad blackish-brown zone around the umbilical region, also with dark brown or black interrupted broad zigzag lines, running interruptedly across the last three whorls, with additional isolated, irregularly disposed, round black spots, principally on the body-whorl; apex pale, denuded of color; transversely finely striated above and below, and concentrically striated at the base; whorls 6, rounded, gradually increasing in size, last slightly deflected in front at its termination; base convex; aperture obliquely ovate-lunate; peristome slightly thickened and everted, margined internally with white, and externally with orange, the external dark band on the body-whorl showing through; margins approximating, joined by a very thin callus; columella dilated externally, adnate over the umbilical region, internal margin descending, straight.

Diam. greatest 0·92, least 0·68; height 0.72 of an inch. (*Cox.*)

Solomon Islands.

H. (*Geotrochus*) *macfarlanei* Cox, P. Z. S. 1873, p. 567.—PFR., Monog. vii, p. 315.

It is somewhat allied to *H. coxiana* Angas.

H. COXIANA Angas. Pl. 3, figs. 36, 37.

Shell imperforate, trochiform, rather thin, obliquely finely striated, polished, creamy-white, the lower whorls ornamented with irregular chocolate-brown spots; spire conical, apex rather obtuse; whorls 6, flatly convex, the last scarcely descending, obtusely angled at the periphery, convex at the base, the umbilical region pale purplish-brown, with the central portion chocolate-brown; columella sloping, flattened, chocolate-brown; aperture very oblique, ovate; peristome

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chocolate-brown, the margins approximate, slightly thickened and expanded, the right flexuous above.

Alt. 22, greater diam. 22, lesser, 19 mill. (*Angas.*)

Ysabel Island, Solomon Group.

Geotrochus coxianus ANGAS, P. Z. S. 1867, p. 889, t. 43, f. 7, 8.—*H. coxiana* PFR., Mon. vii, p. 313.

H. FUCATA Pfeiffer. Pl. 16, figs. 9, 10.

Shell imperforate, globosely-conical, rather solid, shining, porcellaneous, under the lens-obliquely striated, also but more faintly spirally and decussatedly striated; white with three black spiral bands, and another faint reddish one above each of the central bands; spire sharply conical, acute and reddish at the apex, suture smooth; whorls 5, nearly flat, last convex slightly descending, base rather flat, with a black umbilical mark; aperture diagonal, lunately oval; peristome thin, right margin rather straight, anteriorly produced and curved, left expanded and reflected, columellar margin tinged with pink. (*Cox.*)

Alt. 14½, greater diam. 17, lesser 15 mill.

Wide Bay and Marysborough, Queensland, Australia.

H. fucata PFR., Zeitschr. f. Mal. 1853, p. 56; P. Z. S. 1853, p. 59; Mon. Hel. Viv. iii, p. 641.—Rv. f. 1029.—Cox, Monog. p. 67, t. 2, f. 8.

H. CONSCENDENS Cox. Pl. 8, figs. 50, 51.

Shell imperforate, globosely conical, very thin, pellucid, somewhat glassy, rather shining, under the lens obsoletely obliquely striated; whitish, with one band more or less conspicuously colored; spire conical, colored at the tip; whorls 6, slightly convex, last very large, slightly deflected, with an obsolete keel; aperture diagonal, lunately ovate; peristome thin, outer margin somewhat sinuated, columella above slightly reflected.

Diam. greatest 0·60, least 0·50, height 0·55 of an inch. (*Cox.*)

Lismore, Upper Richmond River, Australia.

H. conscendens Cox, P. Z. S. 1866, p. 374; Mon. Austr. L. Sh. p. 67, t. 2, f. 6.

(2.) GROUP OF H. META.

Narrowly obliquely perforated; elevated conical, the periphery rounded or carinated; last whorl not descending in front. Surface smooth, lightly obliquely striatulate. Distribution, Solomon Is.

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H. XANTHOCHILA Pfeiffer. Pl. 9, figs. 67, 68, 69.

Shell obliquely, narrowly perforated, elevated trochiform, smooth, alabastrine-white; spire conical, apex dark; periphery rounded; lip broadly expanded, of a yellow color.

The shell is rather thin, but strong, having slight wrinkles of growth, but no other sculpture; shining, white; spire conical; whorls 6, but slightly convex, the last not descending in front. Columella widely expanded, its inner edge nearly straight and sub-vertical. Aperture quite oblique. The axis is very narrowly perforated throughout. Young shells are keeled.

Alt. 46, diam. 29 mill.

Solomon Is.

H. xanthochila PFR. P. Z. S. 1861, p. 192; Novit. Conch. p. 175, t. 47, f. 5, 6; Monogr. v, p. 334.—DOHRN in continuation of Küster's Conchyl. Cab. p. 584, t. 172, f. 7, 8.—COX, P. Z. S. 1873, p. 567, t. 48, f. 7. (variety.)

A beautiful species, easily known by the size, form and the yellow lip. Part of the specimens before me are marked *Bougainville Island.*

Variety. Lip generally pure-white, and converted into broad crenulated frill. Fig. 69.

H. BEATRIX Angas. Pl. 14, figs. 59, 60, 61, 62, 63.

Shell narrowly perforate, ovately conical, rather thin, not shining, finely obliquely striated, variously colored; spire conoidal: whorls 6½, rounded, narrowly margined at the sutures, the last non-descending, somewhat inflated and obtusely subangulated at the periphery in front, moderately convex at the base; aperture subcircular; the outer lip very slightly expanded and reflected; the columella descending vertically and callously reflected over the perforation. (*Angas.*)

Var. *a.* Rich orange-yellow throughout, inner lip white, apex sometimes of a carnelian color.

Var. *b.* Bright yellow, apex orange, with a narrow black band immediately below the suture of the last whorl, lip black.

Var. *c.* Pellucid-white, upper whorls yellow or orange.

Var. *d.* Upper whorls white, last whorl light brown, with a narrow pale band below the suture, lip white stained inside with purple.

Var. *e.* Very dark purplish-chocolate color, reddish toward the apex.

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This shell, like *Helix meta* Pfr., is subject to remarkable variations in color, but may at once be distinguished by its smaller size, the convexity of the whorls, and the roundness of the aperture, in which the subflexuous outer lip and diagonal form of *H. meta* are wanting. The general form of the shell presents somewhat of a *Paludina*-like aspect. The outer lip is much less expanded and reflected than in *H. meta*, and the texture less glossy and shining. (*Angas.*)

Alt. 26, greater diam. 20, lesser 16 mill.

Solomon Archipelago?

H. beatrix Ang., P. Z. S. 1876, p. 265. t. 20, f. 1–5.

H. choiseulensis Brazier. Pl. 10, fig. 90.

Shell perforate, conical, moderately solid, obliquely very finely striated, reddish-brown, ornamented with a yellow sutural band, and two others below; spire conical, apex acute; whorls 6, moderately convex, the last not descending, slightly angled at the periphery, convex at the base; aperture diagonal; peristome rose colored, rather widely expanded and reflexed; columellar margin dilated and reflected, almost covering the perforation. (*Brazier.*)

Alt. 16, greater diam. 16 mill.

Choiseul Id., Solomon Group.

H. choiseulensis Braz., P. Z. S. 1872, p. 21, t. 4, f. 7.

H. splendescens Cox. *Unfigured.*

Shell covered-perforate, globose-conic, thin, pellucid, smooth, polished, chestnut colored, darker at the carina; a whitish band below the suture, and beneath two wider white bands; spire conic, apex white; whorls 6, subplanate, the last planate above, convex, very obsoletely carinated, produced forward; aperture very oblique, rounded-elongate, subsinuate in front; peristome thin, reflexed, expanded at the straight columella, chestnut colored, narrowly edged with white. Alt. 1·10, greater diam. 0·95, lesser 0·80 inch. (*Cox.*)

Solomon Islands.

H. splendescens Cox, P. Z. S. 1865, p. 696; Journ. de Conchyl. 1866, p. 48.—Pfr., Monogr. v, p. 335.

H. brenchleyi Brazier. *Unfigured.*

Shell narrowly perforate, conical, rather thin, very finely obliquely striated, bright straw-yellow with bright reddish-chestnut band on the periphery running spirally above the suture, below

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the suture broad white opaque band; spire conoid, apex rather obtuse; whorls 6, moderately convex, base convex; aperture diagonal, triangularly ovate, peristome white, thickened and reflected; margins distant, columellar margin broad and expanded over the perforation. (*Braz.*)

Alt. 25, greater diam. 21, lesser 16 mill.

Maru Sound or Curacoa Harbor, Guadalcanar Island, Solomon Archipelago.

H. Brenchleyi BRAZ., Proc. Linn. Soc. N. S. Wales, i, p. 3, 1875. —Pfr. Monogr. vii, p. 582 (not *H. brenchleyi* Angas, P. Z. S. 1878, p. 861,=*H. walleri* Brazier.)

H. MENDANA Angas. Pl. 8, figs. 55, 56.

Narrowly, obliquely umbilicated, elevated trochiform, the periph. ery rounded. Surface striatulate, nearly smooth; buff, with three chestnut bands, the lower one occupying the greater part of the base; suture with a broad white or buff margin. Lip well expanded, white.

The shell is thin, not so strong as *H. meta*. The upper band is often faint; and frequently no bands are seen on the spire. The apex is rather acute; the last whorl has no trace of a keel. Aperture oblique, rounded-subtriangular, white inside and showing the three dark bands. Lip white, well reflexed all around.

Alt. 28, diam. 23 mill.

Bougainville Id., Shortland Id., Stephen's Id. (and Ysabel Id.?), Solomon Group.

H. mendana ANGAS, P. Z. S. 1867, p. 889, t. 43, f. 11, 12.—PFR., Monogr. vii, p. 384.—DOHRN in Contin. of Küster's Conchyl. Cab., p. 571, t. 168, f. 14, 15.—SMITH, P. Z. S. 1885, p. 591.

The shell is less solid, and the upper whorls of the spire rather slenderer than *H. meta* and its varieties. The color pattern is very different, also. The broad basal band is sometimes replaced by a number of narrower stripes.

H. META Pfeiffer. Pl. 9, figs. 59, 60, 61, 63, 70.

Obliquely, narrowly perforated, elevated trochiform, smooth, shining. The last one or two whorls are dark olive, brown or purplish-brown, or clear yellow, becoming blue or purple on the spire; the suture has a conspicuous snow-white border; periphery rounded or bluntly angular; face and back of the lip dark brown.

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Excessively variable in coloring, but typically as described above, (figs. 59, 60, 63), the dark form being typical. The spire is conical, apex obtuse; whorls 5½ to 6, their convexity slight, the last usually obscurely angular at the periphery. Aperture oblique, obtusely subtriangular; lip not widely expanded, typically dark, triangularly reflexed at the umbilicus, inner edge of the columella concave.

Alt. 25, diam. 20 mill.

Alt. 24, diam. 22 mill.

Ysabel and Bougainville, Solomon Islands.

H. meta PFR., P. Z. S. 1856, p. 381, t. 26, f. 5 (not f. 4); Monogr. iv, p. 257.—DOHRN in Contin. of Küster's Conchyl. Cab. p. 588, t. 173, f. 1–3.—*H. deidamia* ANGAS, P. Z. S. 1869, p. 625, t. 48, f. 3.—BRAZIER, Journ. de Conchyl. 1880, p. 311.—*H. acmella* PFR., P. Z. S. 1860, p. 135, t. 50, f. 4; Monogr. v, p. 335.—DOHRN, *tom. cit.* p. 589, t. 173, f. 5, 6.—SMITH, P. Z. S. 1885, p. 590.—BRAZIER, Journ. de Conchyl. 1880, p. 302.

When typical this form may be known by the dark brown or olive body-whorl, purple spire and broad white sutural border. There are, however, many variations in color pattern. One of the commonest is pictured in fig. 60. The color is clear yellow becoming purple above; sutural band present; lip dark. Another yellow form lacks the purple on spire, and has the lip white; suture bordered.

H. deidamia Angas (Pl. 9, fig. 70) is a synonym of the typical form.

Var. ACMELLA Pfr. Pl. 9, figs. 64, 65, 66, 62.

Upper portion of the outer lip more expanded; color clear-light-olive-yellow, paler on the spire; lip white.

The alleged differences of form between this and *H. meta* do not hold in the series of 36 specimens before me, in which some shells with the widest body-whorl, have the typical coloration of *meta* (fig. 63). *H. acmella* has been collected on Bougainville, Ysabel, Faro and Florida Islands of the Solomon Group. The locality "Admiralty Islands" originally given for the species, is incorrect.

Smith mentions a specimen from the coral limestone region of Florida Island, which has the body-whorl of a salmon tint and the three uppermost volutions bright red. The lip is white. A specimen before me has the same coloration. This form corresponds with fig. 4, of plate 36, P. Z. S. 1856, considered by Pfeiffer as a form of *meta*. I have figured it on Pl. 17, fig. 27.

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H. PLAGIOSTOMA Pfeiffer. Pl. 10, figs. 88, 89.

Narrowly perforated, elevated trochiform, carinated at the periphery; slightly striated obliquely; covered with a thin yellowish-olive epidermis, beneath which the substance of the shell is purplish-pink; the lip expanded and of the same color.

The spire is conical; whorls 5½, the last not descending in front. The upper whorls are pale purple-pink, as is the whole shell when denuded of the thin epidermis. There is a yellowish-white border below the suture. The base sometimes shows very fine concentric striæ under a lens and is rather flattened. Aperture subtriangular; outer lip expanded, thin, flesh colored or purplish; columella triangularly reflexed, its inner face nearly straight and vertical.

Alt. 26–26½ diam. 21–22 mill.

Solomon Islands.

H. plagiostoma PFR., P. Z. S. 1856, p. 381; Mal. Bl. 1856, p. 238; Monogr. iv, p. 255.

Allied to *H. adonis*, but of a totally different tone of coloration, wider body-whorl, and the upper part of the outer lip is more expanded. The locality "Admiralty Is" given by Pfeiffer is an error.

H. GUPPYI Smith. Pl. 10, fig. 95, (enlarged).

Shell elevately conical, thin, pale yellow, ornamented with conspicuous nearly black or black-brown spiral bands, one above and one below the sutures of the upper whorls, and three upon the last, one sutural, the second peripheral, and the third basal; volutions 6, rather slowly enlarging, a little convex, sculptured with fine oblique striæ of growth, not glossy. Three first whorls livid purplish, the last rather sharply angled at the middle, not descending in front, having the basal band broad around the almost concealed perforation, and obsolete within the aperture. The latter is oblique, somewhat narrowed and pouting in front, banded within with three almost black and two white bands, the central one of the former being squarely truncate at the end, only the lower corner of it touching the margin of the lip, which is pale, oblique, receding, a little expanded and reflexed in front at the columellar margin, the upper end of which is spread and nearly conceals the small umbilicus.

Height 22½ mill., greatest diam. 19, smallest 16. (*Smith.*)

Faro Island, Bougainville Straits; in the higher parts of the island up to the summit, 1900 feet above the sea.

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H. guppyi E. A. SMITH, P. Z. S. 1885, p. 591, t. 36, f. 4.

This species is remarkable for the striking contrast of its color-bands and the angular character of the last whorl. (*Sm.*)

H. MISER COX. *Unfigured.*

Shell narrowly perforate, thin, coniform, obliquely finely striated; color reddish chestnut, becoming pale yellowish-brown towards the apex; spire elongated; whorls 7, very gradually increasing in size, the last one being subcarinated; base rounded, aperture lunar oval; periphery straight; margins slightly approximating, and united by a rather thin columellar callus, which descends perpendicularly, and becomes broadly dilated, concealing the umbilicus; aperture and interior of the lip pale, the lip shortly reflected throughout.

Diam., greatest 0·80, least 0·68; height 1·22 inch. (*Cox.*)

Solomon Islands.

H. miser COX, P. Z. S. 1873, p. 146.—PFR., Monogr. vii, p. 383.

H. ADONIS Angas. Pl. 10, fig. 86.

Narrowly perforated, elevated trochiform, the periphery carinated; lightly obliquely striated; of a light orange-buff tint, the lip of the same color.

The shell is thin, the smoothness of the surface slightly broken by close but inconspicuous growth lines; spire conical, apex subacute; whorls 5½, the earlier quite convex, the last two less so; last whorl rather acutely keeled at the periphery, not descending in front; base nearly flat and microscopically spirally striated; aperture subtriangular, oblique; outer lip thin, scarcely expanded above, outer and basal margins expanded, columellar margin triangularly reflexed over and almost covering the umbilicus. Inner edge of the columella vertical, straight. Alt. 24, diam. 18–19 mill.

Bougainville Island, Solomon Group.

H. adonis ANGAS, P. Z. S. 1869, p. 624, t. 48, f. 4.—PFR., Monogr. vii.—BRAZIER, P. Z. S. 1872, p. 805.—*H. metula* CROSSE, Journal Conchyl. 1870, p. 248.

More acutely keeled than *H. meta* or *acmella*, not so smooth, and having the lip as well as the whole shell, of a fleshy-buff color. It differs from *H. plagiostoma* in being narrower, lacking a subsutural white band, and of a different color.

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H. BLANDA Cox. *Unfigured.*

Shell imperforate, conical, very thin, translucent, obliquely finely striated, of a pale brownish-yellow; spire with the apex acute; whorls 7, gradually increasing in size, the last moderately inflated and sharply carinated at the periphery; base flattened; suture not margined; aperture subrhomboidal, margins somewhat approximating, not united by a callus, subangulate at the periphery of the last whorl; margins simple, slightly everted, columellar margin descending vertically, joining the basal margin at an obtuse angle. (*Cox.*)

Alt. ·92, greater diam. ·76, lesser ·64 inch.

Solomon Is.

H. blanda Cox, P. Z. S. 1873, p. 147.

This species is closely allied to *H. adonis* of Angas, but after comparing it with a number of specimens of that species I feel sure that it has permanent differences; it is a much thinner and lighter shell, much more sharply keeled, and much less coarsely sculptured. (*Cox.*)

H. MENDOZA Brazier. Pl. 10, fig. 87.

Shell narrowly perforate, conical, rather thin, very finely obliquely striated, light-straw color throughout; spire conoid, apex rather obtuse; whorls 6 to 6½, slightly convex, narrowly channelled at the suture, sharply carinated and angled at the periphery, base rather flat; aperture oblique, triangularly ovate; peristome thin, white, right margin a little expanded, columellar margin reflexed, and expanded over the perforation. (*Brazier.*)

Alt. 16, greater diam. 13, lesser 11 mill.

Choiseul Island, Solomon Group.

H. mendoza BRAZIER, P. Z. S. 1872, p. 21, t. 4, f. 8.

Evidently allied to *H. adonis*, but more acutely keeled.

H. HERMIONE Angas. Pl. 9, figs. 73, 74.

Narrowly, obliquely perforate, thin, elevated trochoidal, the last whorl carinated, base rather flattened; surface obliquely striatulate, nearly smooth. Dark purplish-brown, with a buff band a short distance below the carina, and generally another midway between carina and suture. Earlier two or three whorls deep blackish-purple.

Spire conical, rather slender; whorls 6, convex, the last not descending in front. The rather flat base is bounded by an angle. Aperture oblique, rounded-subtriangular, showing the bands within.

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Outer lip thin, narrowly expanded, slightly sinuous; triangularly dilated at the umbilicus, nearly closing it; columella vertical, slightly arcuate. Alt. 22, diam. 18 mill.

Bougainvillé Island, Solomon Group.

H. hermione ANGAS, P. Z. S. 1869, p. 625, t. 48, f. 5.—PFR., Monogr. vii, no. 2672.—BRAZIER, P. Z. S. 1872, p. 805.—*H. biocheana* CROSSE, Journ. de Conchyl. 1870, p. 249.

Smaller and thinner than any form of *H. meta*, more distinctly carinated, differently colored, and with a narrower lip.

H. MIGRATORIA Pfeiffer. Pl. 6, figs. 99, 1, 2, 3; pl. 17, figs. 31, 32.

Narrowly, obliquely perforated; trochiform periphery obtusely angular; very lightly striated, with traces of spiral lines on the base; shining flesh colored, often varying toward white or brown; usually having a brown band below the periphery and another on the upper surface, but often bandless, and generally showing some sparsely scattered translucent-grayish dots. Lip narrowly expanded, white. Suture bordered by a narrow brown line.

The shell varies greatly in form. Spire conical, whorls 5, convex, apex obtuse; the last whorl is convex above, and has an inconspicuous angle at the periphery. The base is convex. The whorl generally descends a trifle in front. Aperture very oblique, flesh colored, white or banded within; outer lip markedly sinuous, narrowly reflexed, dilating at the columella, almost covering the narrow perforation.

The banding is excessively variable.

Alt. 16½, diam. 17 mill.

Alt. 22⅓, diam. 18 mill.

Alt. 20, diam. 17 mill.

Guadalcanar, San Christoval, etc., Solomon Is.

H. migratoria PFR. P. Z. S. 1855, p. 108, t. 32, f. 3; Monogr. iv, p. 260.—DOHRN, Contin. Conchyl. Cab. p. 587, t. 172, f. 16–19.—*H. leucophœa* COX, P. Z. S. 1872, p. 20, t. 4, f. 5.

This species has a pallid, faded aspect, and in some respects it approaches several imperforate species. Ten of the eleven specimens before me show the grayish dots mentioned above, although there are very few on some of the specimens. The principal color forms are as follows:—

a. Straw-colored without band or dots.

b. Straw-colored, sparsely dotted.

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c. Buffish-flesh-colored, with dots and two faint pink bands, one above, one below, the periphery.

d. The same ground color, with dark-brown bands.

Figure 31, of Pl. 17, is Pfeiffer's type. Fig. 1, Pl. 6, is the *leucophæa* of Cox.

The largest specimen I have seen is figured on Pl. 17, fig. 32.

(3.) Group of H. pileus.

Narrowly, obliquely perforated; elevated-conical; last whorl not descending; outer lip expanded; surface smooth, obliquely striatulate. Differs from the group of *H. meta* only in distribution, the present group being confined to the Moluccas and Papua.

H. euchroes Pfeiffer. Pl. 8, figs. 40, 41.

Shell half-covered perforate, conical, rather solid, obliquely irregularly striate, and very minutely granulate under a lens; a little shining, reddish-brown, ornamented with chestnut bands and a wider white one below the suture. Spire regularly conical, lilac-roseate above, apex rather acute. Whorls 7, moderately convex, sensibly increasing, the last not descending, subrotund. Aperture very oblique, subrhombic-lunar, grayish-white inside; peristome thin, its reverse chestnut colored, margins joined by a thin callus, the right margin broadly expanded and subreflexed, basal somewhat straightened, reflexed, forming an angle with the columellar margin, which is vertical, slightly arcuate, triangularly dilated, half covering the perforation. Alt. 35, diam. 36 mill. (*Pfr.*)

East Indies (Pfr.); *Celebes* (Rve.).

H. euchroës Pfr., Mal. Bl. i, 1854, p. 57; Monogr. iv, p. 256; Novit. Conch. i. p. 2, t. 1, f. 7, 8.—Reeve, Conch. Icon. f. 1346.

One of the largest species of *Papuina*. The locality is not known. Only one specimen has been placed on record, the figure of Reeve and those in the Novitates being evidently drawn from the same shell. It is apparently allied to *H. pileus*, but is larger, broader, and differently colored. Compare also *H. amphizona* (pl. 8, figs. 52–54), a species with solid, not perforated, axis, and different columella and coloring, but of similar size.

H. lenta Pfeiffer. Pl. 9, fig. 71.

Rather openly perforate, trochiform, rather thin, very lightly striate, grayish-flesh-colored or reddish-corneous, with opaque white bands; spire elongate-conic, rather acute; whorls 7½, nearly flat,

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slowly increasing, the last slightly descending in front, subangulate, the base flat, radiately striated. Aperture very oblique, subtrigonal-oval, concolored within; peristome thin, broadly expanded and a little reflexed, violet-blackish; right margin lightly arched, basal straightened, the columellar vaultingly reflexed.

Alt. 29, greater diam. 29, lesser 24 mill. (*Pfr.*)

Moluccas?

H. lenta PFR., Malak. Bl. 1854, p. 57; Monogr. iv, p. 257.—*H. pileus var.* PFR., Mon. Hel. Viv. i, p. 324; Küsters Conch. Cab., p. 157, t. 40, f. 5.

H. PILEUS Müller. Pl. 8, figs. 42, 43, 44, 45.

Narrowly, obliquely perforated, turrited trochiform, thin but strong. Periphery obtusely subcarinated. Base rather flat, deep brown; suture margined with a dark line; upper surface of whorls light, with or without dark bands or lines, lip broadly expanded, white.

The spire is high-conical, base rather flat; surface smooth, lightly striatulate; apex obtuse, the earlier two whorls dark purple or reddish; suture shallow; whorls 6, the last obtusely angled at the periphery, not descending in front. Aperture very oblique, subtriangular, brown or banded within. The entire lip is broadly expanded, white. A circular tract of dark brown almost covers the base, extending nearly to the periphery; above this the surface is cream colored, pinkish or yellowish, with or without brown spiral bands and lines.

Alt. 30, diam. 22 mill.

Alt. 32, diam. 26 mill.

Aru Islands.

H. pileus MULL., Hist. Verm. p. 80.—BORN, Test. Mus. Cæs. t. 16, f. 11, 12.—CHEMNITZ, Conch. Cab. ix, f. 1046–1048=edit. nov. t. 21, f. 1–3.—FER., Hist. t. 63A, f. 3–8.—LAM., edit. Dh., viii, p. 64.—PFR., Monogr. i, p. 324.—CHENU, Illust. Conch. t. 6, f. 4–6.—REEVE, Conch. Icon. f. 493.—v. MARTENS, Ostas. Landschn. p. 323.—*Helix pileata, bifasciata* and *Bulla ambigua* of GMEL., Syst. xiii, pp. 3431, 3609.—*Geotrochus pileus* BECK, Ind., p. 47.—WALLACE, P. Z. S., 1865, p. 411.—*H.* (*Geotrochus*) *pileus* TAP. CAN., Ann. Mus. Civ. Genov. xix, p. 137, 1883.

Distinguished by its high, turrited form. The pattern of banding is very variable. Tapparone describes a form with light colored apex.

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H. LACTEOLATA Smith. Pl. 1, fig. 11.

Shell conical, perforated, encircled with zones of a milk-white and of blackish-brown blotched with white. Whorls 5, striated with oblique growth-lines, the last whorl rounded at the periphery, slightly convex beneath, a little descending in front. Aperture very oblique, purplish-blackish toward the lip, blue within; peristome white, expanded all around and a little reflexed; columellar margin livid-brown above, broadly dilated, partly closing the umbilicus. Alt. 34, greater diam. 36, lesser 28 mill. (*Smith.*)

Foot of Owen Stanley Mts., British New Guinea.

H. (*Geotrochus*) *lacteolata* SMITH, Ann. Mag. N. 5th. Ser. xix, p. 420, t. 15, f. 9, 1887.

Bears considerable resemblance to *H. plurizonata* Ad. & Rv., from Mindanao, but has a very much more elevated spire, more raised body-whorl, and the volutions increase less rapidly. The colored bands are eight in number on the last whorl. Most of them are almost black, and generally margined with brown, and more or less blotched and smeared with an opaque cream color. (*Smith.*)

H. BLAINVILLEI Le Guillou. Pl. 3, figs. 59, 60; pl. 8, figs. 57, 58; pl. 9, figs. 75, 76.

Shell umbilicate, conical, solid, irregularly elevately striate, opaque, a little shining, buffish-flesh-colored; spire conic, apex obtuse; suture submargined; whorls 7, convex, the last subangular at the periphery, encircled by a reddish line; not descending in front; flattened somewhat below, umbilicus very narrow. Aperture little oblique, subtetragonal; peristome white, upper margin very strongly arched, expanded, basal margin substraightened; columella lilac colored, short, vertical, reflexed. Alt. 22, greater diam. 22, lesser 19 mill. (*Pfr.*, under *H. gärtneriana.*)

Aru Is.

H. blainvillei LE GUILL., Rev. Zool. 1842, p. 140.—PFR., Monogr. i, p. 327.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. vi, p. 561, 1874; xix, p. 129, 1883, t. 3, f. 4, 5.—*H. gärtneriana* PFR., P. Z. S. 1851, p. 253; Monogr. iii, p. 220; Conchyl. Cab., p. 402, t. 145, f. 1, 2.—Rv., Conch. Icon., f. 419.—FORBES, Voy. Rattlesnake, p. 373, appendix.—WALLACE, P. Z. S. 1865, p. 411.—*H. zoæ* PFR., Mal. Bl. xii, 1865, p. 121; Monogr. v, p. 326; Novit. Conch., p. 274, t. 67, f. 16, 17.—*H. pileolus* PFR. (not Fér.) Symb., p. 75; Monogr. i. p. 324.

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The above synonymy was first worked out by Tapparone Canefri. The prominent characters of the species are its elevated spire, angular periphery begirt with a brown line, strong, regular sculpture, etc.

Var. *a*. (pl. 3, fig. 59). Shell more convex, umbilicus more open, periphery less angular, destitute of a brown line. (*Tap. Can.*)

Var. *b*. (pl. 3, fig. 60). Shell less elevated, distinctly carinated, whorls less convex.

The *H. gärtneriana* of Pfeiffer (pl. 8, figs. 57, 58) was reported from *Night Island, N. Australia* by Macgillivray, but doubtless erroneously, mistaking for it the somewhat similar *H. poiretiana*. See also TATE, Trans. & Proc. Roy. Soc. S. Australia, v, p. 49, 50, 1881–'82. The *H. zoæ* Pfr. is figured on pl. 9, figs. 75, 76. It seems to be completely synonymous.

H. poiretiana, which also has a basal brown line, differs from this species in having the last whorl decidedly descending in front.

H. CANOVARII Tapparone Canefri. Pl. 3, fig. 56.

Nearly covered umbilicate, elevated trochiform, longitudinally very closely and minutely obliquely striated; carinated; pale horn colored, but when the epidermis is removed it is pale violaceous, flesh-colored toward the apex.

Spire high-conical, apex sub-acute. Whorls nearly 7, a little convex, separated by a distinct suture, margined above; last whorl rather acutely carinated below its middle; base little convex, having very delicate radiating striæ. Aperture ovate-subrhomboidal, oblique; peristome amethystine, a little thickened, all around subexpanded and more reflexed, margins not approximating, the outer lip sub-angular in the middle, basal lip nearly straight, columella little oblique, dilated, almost closing the umbilicus.

Alt. 21, greater diam. 21, lesser 19 mill. (*T. C.*)

Banks of the river Fly, New Guinea.

H. canovarii TAP. CAN. Ann. Mus. Civ. Genov. xix, p. 137, t. 3, f. 6, 1883.

Allied to *H. blainvillei* and *H. blanfordi*. Also to *H. plagiostoma* of the Solomon Is.

H. BLANFORDIANA H. Adams. Pl. 17, fig. 33.

Covered perforate, conoid, rather thin, obliquely striated, and ornamented with spiral minute striæ; shining, corneous-white.

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Spire elongated, rather acute; suture margined; whorls 6, a little convex, perceptibly increasing, the last not descending in front, having an acute carina below the middle; base but little convex. Aperture oblique, subrhomboidal-lunar; peristome white, narrowly expanded, the upper margin acute, basal arcuate, reflexed, covering the perforation. Alt. 17, greater diam. 20, lesser 16 mill. (*Ad.*)

Port Dorey, Andai, Amberbaki, New Guinea; Moluccas.

Geotrochus blanfordi H. Ad., P. Z. S. 1865, p. 415, t. 21, f. 1 (preoc.).—Wallace, *l. c., p.* 412.—*H. blanfordi* Pfeiffer, Monogr. v, p. 327, 501.—*H. blanfordiana* H. Ad., P. Z. S. 1869, p. 275.—*H. blainfordiana* (*sic*) Tapparone Canefri, Ann. Mus. Civ. Genov. xix, p. 133, 1883.—*H. poirieri* Tap. Can., Bull. Soc. Zool. Fr. 1878, p. 270.—*H. turbinata* Val., in schedis Mus. Zool. Parisiensis *teste* Tapp. Can., not *turbinata* of Beck or Jan.

The variety called *poirieri* by Tapporone Canefri is more elevated, aperture rounder, base less dilated than the type.

(4.) Group of H. poiretiana.

Narrowly, obliquely, perforated; elevated-trochiform; the last whorl descending in front; the superior lip not expanded. Surface obliquely lightly striatulate.

Differs from the groups typified by *H. meta* and *H. pileus* in the descending last whorl, and simple, not expanded outer lip.

H. poiretiana Pfeiffer. Pl. 8, figs. 46, 47, 48, 49.

Narrowly, obliquely perforated, elevated-conical, the periphery rounded; last whorl, deeply deflexed in front; color white, with a narrow brown line below the middle of the body-whorl, and a faint brown spot on the columella.

The spire is high-conic, apex obtuse; whorls 7, scarcely convex, the last descending in front. Surface somewhat shining, obliquely striatulate; pure-white above, brown-tinged beneath, with a narrow band (often sub-obsolete) just under the periphery. Aperture transversely oblong; upper and outer lips, not expanded, basal lip somewhat expanded, triangularly dilated at the umbilicus, which it nearly conceals.

Alt. 23½, greater diam. 19, lesser 16 mill.

Night Island, N. E. Coast Australia.

H. poiretiana Pfr. P. Z. S. 1851, p. 254; Monogr. iii, p. 149; Conchyl. Cab. p. 372, t. 140, f. 5, 6.—Rve., Conch. Icon. f. 418.—

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Cox, Monogr. Austr. L. Sh. p. 66, t. 2, f. 1.—Hedley, Proc. Roy. Soc. Queensl. v, p. 63.

A pyramidal white shell, having some slight resemblance to *H. gärtneriana*, but differing in the deflexion of the whorl at the aperture, non-expanded outer lip, etc. The species has, in fact, no near relatives.

(5.) Group of H. antiqua.

Globose-turbinate species, perforated, the spire elevated, last whorl not carinated, not descending in front; lip broadly expanded, the concave columellar margin having a small tooth in the middle.

H. antiqua Adams & Reeve. Pl. 14, figs, 56, 57; pl. 17, fig. 36.

Shell covered-perforate, globose-turbinate, solid, obliquely striated, white. Spire turbinate, apex rather obtuse. Whorls 4½, convex, rapidly increasing, the last rounded, not descending in front. Aperture oblique, truncate-oval; peristome simple, broadly expanded and reflexed, the columellar margin subcallus, subdentate inside, dilated-appressed above the perforation. (*Pfr.*)

Alt. 31, greater diam. 30 mill.

Usang, Borneo.

H. antiqua Ad. & Rv., Voy. Samarang, Zool. p. 61, t. 16, f. 1.—Rve., Conch. Icon. f. 402.—Pfr., Monogr. iii, p. 172; Conchyl. Cab. p. 400, t. 144, f. 14, 15.—v. Mart., Ostas. Zool. Landschn. p. 322.

A unicolored white shell, with rounded periphery and toothed columella.

Var. xanthosoma Pilsbry. Pl. 17, fig. 36.

Obliquely umbilicated, turbinate; composed of 4½ whorls, the earlier two very convex, the last not descending in front; suture impressed, margined below by an impressed line. Surface very delicately obliquely striatulate; color lemon-yellow, paler on the last whorl. Aperture rather large, oblique, with a satin-like luster inside; lip white, very broadly expanded, and reflexed; columellar margin arcuate, toothed in the middle, broadly expanded above and around the oblique umbilicus which rapidly narrows to a mere perforation.

Alt. 24½, greater diam. 22, lesser 17½ mill.

Aperture (measured outside of peristome), oblique alt. 19, width 17¾ mill.

New Guinea?

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Agrees with *H. antiqua* in form and proportional size of aperture, but differs in the clear lemon-yellow color. In this last character it resembles the form described by Sowerby as *H. horderi*, but that species has a far more elevated spire and greater number of whorls. I have doubts as to whether this form and the next are actually from New Guinea, as alleged.

H. HORDERI Sowerby. Pl. 14, fig. 58.

Narrowly perforated, elevated, conical, rather solid, obliquely very finely striated, yellow. Spire elevated, apex acute. Whorls 6, a little convex, the last slightly inflated, obsoletely angled at the periphery, the base convex. Aperture wide, oblique; peristome broadly expanded and reflexed, columellar margin provided with a small tooth-like tubercle inside, outwardly dilated, flattened.

Alt. 35, diam. 30 mill. (*Sowb.*)

New Guinea.

H. (*Geotrochus*) *horderi* G. B. SOWERBY, JR., P. Z. S. 1889, p. 577, t. 56, f. 1.

Differs apparently from *H. antiqua* in the yellow color, greater number of whorls and higher spire, consequently the mouth is shorter in proportion to the total length.

(6). GROUP OF H. PILEOLUS.

Subperforate or imperforate; pyramidal, acutely carinated, the base flat. Distribution, Moluccas and New Guinea.

H. PILEOLUS Férussac. Pl. 11, figs. 99, 100, 1, 2, 3.

Nearly covered-perforate, trochiform, carinated, rather solid, striatulate, the base minutely decussate-granulose; opaque, whitish or brownish, flamed with brown; apex acute, liver-brown; spire conical, more or less elevated; suture superficial, hair-margined. Whorls 5, the earlier 2 or 3 convex, the remainder flat, the last a little convex below, descending a little (rarely not at all) in front. Aperture very oblique, rhombic-triangular, the peristome reflexed, white or pale rose-brown; at the outer angle it is curved over into a beak, and at the columellar insertion it is dilated. (*Mart.*)

Batchian and Little Tawalli Islands, Moluccas.

H. pileolus FER., Hist., t. 63A, f. 1, 2.—v. MART., Ostas. Zool., Landschn., p. 231, t. 17, f. 8–10.—PFR., Monogr. v, p. 326, 501.—*Geotrochus pileolus* WALLACE, P. Z. S. 1865, p. 412.

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The following forms are described by v. Martens:

Form *turrita* (figs. 2, 3). White or pale isabelline, painted with narrow blackish-brown lightning-streaks; last whorl distinctly descending. Alt. 20, diam. 20½ mill. This is like Férussac's fig. 2.

Form *pyramidata* (figs. 99, 100). Pale brownish; marbled with broader subdiaphanous brown lightning-streaks; base nearly unicolored, the last whorl scarcely descending. Alt. 21, diam. 24 mill. This corresponds to Férussac's fig. 1.

Form *convexa*. Subdepressed, whitish, marbled with wider lightning-streaks of pale brown; base nearly unicolored; last whorl abruptly descending. Alt. 14, diam. 24 mill.

Form *depressa* (fig. 1). Whitish, with rather narrow brown markings, the base unicolored.

H. RHYNCHOSTOMA Pfeiffer. Pl. 11, figs. 96, 97, 98.

Narrowly umbilicated, trochiform, acutely carinated, rather thin, striatulate and under a lens very minutely granulated; flesh-colored, with two reddish bands, one above, the other wider and on the base. Spire conical, somewhat obtuse, suture carino-marginate; whorls 6, nearly flat, slowly widening, the last scarcely descending in front, base nearly flat. Aperture very oblique, subtriangular; peristome thin, margins distant, the upper slightly expanded, recurved into a beak at the outer angle; basal margin narrowly reflexed, columellar dilated, concealing the umbilicus. Alt. 17, greater diam. 25, lesser 22 mill. (*Pfr.*)

Batchian, Moluccas.

H. rhynchostoma PFR., P. Z. S. 1861, p. 21, t. 2, f. 6; Novit. Conch. p. 166, t. 45, f. 9–11; Monogr. v, p. 328, 501.

Evidently allied to *H. pileolus*, but totally different in coloration.

H. FERUSSACI Lesson. Pl. 3, fig. 51.

Shell imperforate, trochiform, deep-chestnut, with a golden-yellow line at the carina, and ascending the spire to the apex; whorls 6, completely flat; the apex is enlarged, convex; the last whorl has a salient acute carina. Aperture much depressed, triangular, wider than high, very acute at the junction of the upper and basal lips; peristome reflexed, sinuous at the angle.

Port Dorey, New Guinea, on trees.

Helicogona (*helix*) *Ferussacii* LESSON, Voy. de la Coquille, Zool. ii, p. 315, t. 8, f. 5.—*Helix Ferussaci* PFR. Monogr. Hel. Viv. i, p.

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231—TAPPARONE CANEFRI Ann. Mus. Civ. Genov. xix. p. 135, t. 3, f. 7. (Figure copied from Lesson.)

This species is well described and figured by Lesson in 1830. It has not been seen by subsequent writers. The deep-chestnut shell is begirt with a yellow peripheral line. See below.

Var. EXSULTANS Tapparone-Canefri. Pl. 3, figs. 48, 49, 50, 58.

Imperforate, trochiform, rather solid, obliquely finely striatulate, chestnut or cinnamon colored, with a carinal yellowish band and an infra-sutural chestnut band, ascending the spire. Spire concave-conic, apex obtuse; whorls 7, the upper ones convex, the rest flat, the last acutely carinated, not descending in front; base but little convex, deep chestnut. Aperture very oblique, depressed subrhomboidal; peristome rather thin, the upper margin expanded, flexuous at the carina; basal margin subdilated, reflexed. Alt. 20, greater diam. 23, lesser 19 mill. (*Pfr.*)

Dorey Hum, Northern New Guinea.

H. ferussaci PFR., Novit. Conch., p. 212, t. 56, f. 7–9; Monogr. Hel. Viv. v, p. 272.—*Geotrochus ferussaci* WALLACE, P. Z. S. 1865, p. 412.—*H. exsultans* TAP. CAN., Ann. Mus. Civ. Genov. xix, p. 135, t. 3, f. 8 (fig. copied from Pfr.); Ann. Mus. Civ. Genov. xxiv, p. 137, 1887.

The apex is submamillar, not acute. It may be a species distinct from *H. ferussaci*, but it is so closely allied that specimens of the latter should be compared.

H. PYTHONISSA Tapparone Canefri. Pl. 3, fig. 57.

Shell covered perforate, elevated trochiform, under a lens seen to be minutely, irregularly obliquely striated and having obsolete spiral striæ; whitish-corneous; apex rather acute, reddish-corneous. Whorls 7, a little convex at the sutures, sub-concave in the middle, separated by sharply margined sutures, last whorl not descending in front, acutely compressedly carinated below the middle, the base nearly flat. Aperture oblique, triangular-lunate, produced into a short rostrum at the keel; peristome narrow, thin, upper margin acute, sinuous, arched forward, basal margin arcuate-reflexed; columella dilated toward its insertion, having a squarish tooth within.

Alt. 22, greater diam. 25, lesser 19 mill. (*T. C.*)

Is. of Sorong, near New Guinea.

H. pythonissa T. C., Ann. Mus. Civ. Genov. xix, p. 136, t. 3, f. 9.

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Intermediate between *H. turris* and *H. ferussaci*. It differs from the latter in being larger, lighter-colored, and having a columellar tooth.

H. LEONARDI Tapparone Canefri. *Unfigured.*

Ovate-conoid, perforate, rather solid, pale yellowish-green or reddish, sometimes subfasciate on the base; spire conical, apex subacute. Whorls 5, convex, separated by rather deep sutures, decussated by spiral and longitudinal subgranose striæ; last whorl large, rather tumid, subcontabulate above, subangular below, the base convex. Aperture very oblique, ovate-lunate; fauces citrinous or brownish-red; peristome white-edged, broadly reflexed, margins joined by a thin callus, the upper and outer regularly curved, basal nearly straight; columellar margin reflexed above the perforation, dilated at the insertion, the base forming a more or less developed tooth. Alt. 34, greater diam. 30, lesser 22 mill. (*Tapp. Can.*)

Ansus, Island of Jobi, Bay of Geelvink; Korido, Is. of Misori, Geelvink Bay, New Guinea.

H. leonardi T. C., Ann. Mus. Civ. Genov. 1877, p. 137.

H. TURRIS H. Adams. Pl. 17, fig. 28, 29.

Shell nearly covered perforate, solid, conical; sulcate-striate; buffish-tawny; spire elongated, rather acute; whorls 7, a little convex at the sutures, subconcave in the middle, the last not descending in front, angulated, the base nearly flat; aperture oblique, triangular; peristome simple, broadly expanded, white, the upper margin sinuous, arched forward; basal margin reflexed, with oblique columella triangularly dilated, reflexed above the perforation and subdentate inside. Alt. 37, greater diam. 36, lesser 30 mill. (*Ad.*)

Island of Waigheu.

H. turris H. AD., P. Z. S. 1865, p. 415, t. 21, f. 4, 5.—PFR., Monogr. v, p. 325.—*Geotrochus turris* WALLACE, *l. c.*, p. 411.

H. FERGUSONI H. Adams. Pl. 3, fig. 54.

Shell imperforate, rather thin, conical, obliquely flexuously plicate-striate; seen under a lens to be closely spirally striolate; pale-tawny; spire elevated conical, apex rather acute, suture hair-margined; whorls 7, nearly flat, the last not descending, acutely carinated at the periphery, the base nearly flat. Aperture oblique, triangular-ovate, the peristome broadly expanded, slightly reflexed, white, margins joined by a thin callus; right margin flexuous, col-

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umella sloping, nearly straight, triangularly dilated, forming an angle with the basal lip.

Alt. 32, greater diam. 18, lesser 13 mill. (*Ad.*)

Island of New Britian.

Geotrochus Fergusoni Ad., P. Z. S. 1872, p. 614, t. 42, f. 14.

Nearly allied to *H. turris*, but imperforate, smaller, thinner, more acutely keeled.

H. steursiana Shuttleworth. *Unfigured.*

Shell nearly-covered perforate, acutely conical, trochiform, thin, subdiaphanous, very acutely carinated; reddish-corneous, covered with very fugacious epidermis; delicately striated, and having very delicate spiral lines. Spire much elevated, apex papillar; whorls 8, flat or subconcave in the middle, the last whorl flat on the base; suture hair-like, subimpressed, margined with tawny. Aperture very oblique, triangular-ax-shaped; peristome rosy, upper margin expanded, channelled and beaked at the carina, basal margin reflexed, callous, thickened, reflexed at the columella, covering the perforation. Columella arcuate, furnished with a white tooth-like callus inside. Alt. 30, greater diam. 40, lesser 35 mill. (*Shutt.*)

Amboyna.

H. steursiana Shuttlw., Bern. Mittheil. 1852, p. 200.—Pfr., Monogr. iii, p. 179.

(7). Group of H. vitrea.

Umbilicated; depressed, acutely carinated; aperture angular.

Moluccas and New Guinea.

H. vitrea Férussac. Pl. 12 figs. 35, 36.

Shell very narrowly umbilicated, *depressed* pyramidal, acutely keeled, rather thin, closely irregularly striatulate, minutely granulated, scarcely shining, *isabelline-whitish*, with a very narrow peripheral band; spire conoidal, apex sub-globose; whorls 4½, a little convex, the suture shallow; last whorl slightly and nearly equally convex above and below, the keel minutely crenulated; obtusely angulated around the umbilicus, in front descending a little below the carina; aperture slightly oblique, trapezoidal-semiovate; peristome expanded, thin, pale-roseate or white, dilated at the insertion of the columella. Alt. 14½, greater diam. 27, lesser 21 mill. (*Mts.*)

Islands of Moti, Ternate and Gilolo, Moluccas; Port Dorey and Amberbaki, New Guinea.

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H. vitrea FER., Hist. t. 64, f. 4 (bad).—PFR., Conchyl. Cab. p. 70, t. 76, f. 18, 19, (copy of Férus.); Monogr. i, p. 326.—TAPPARONE-CANEFRI. Ann. Mus. Civ. Genov. xix, p. 116, 1883.—*H. albula* LE GUILL. Rev. Zool. 1842, p. 139.—PFR., Monogr. i, p. 328.—MARTENS Ostas. Exped. Landschn. p. 319, t. 17, f. 6.—*Geotrochus vitracea* BECK, Index, p. 48.

H. ARROWENSIS Le Guillou. *Unfigured.*

Shell trochiform, carinated, subumbilicate, white, hyaline; whorls 5, a little convex, the base depressed; substriate; last whorl having an acute carina, convexly depressed below. Spire conical, apex obtuse. Aperture subsemiovate, margin reflexed; lip broad, nearly covering the umbilicus. Alt. 12, diam. 17 mill. (*G.*)

Aru Islands.

H. arrowensis LE GUILL., Rev. Zool. 1842, p. 139.—PFR., Monogr. i, p. 327.—*Papuina arrowensis* WALLACE, P. Z. S. 1865, p. 411.

Known to me by the original description only.

H. LANCEOLATA Pfeiffer. Pl. 11, figs. 4, 5.

Shell half-covered perforate, pyramidal, acutely carinated, obliquely striate and very delicately undulate-granulose; above pale brownish, obsoletely banded, *below of a blackish blood-red*, the keel pale. Spire moderately elevated, apex subglobose; whorls 5, the two earlier convex, the rest flat above, the last whorl a little convex beneath, descending a little below the carina in front. Aperture oblique, triangular-trapezoidal; peristome violet, margin at the upper insertion slightly expanded, broadly revolute at the outer angle, distinctly reflexed below, and dilated at the columellar insertion. (*Mts.*)

Alt. 17½, greater diam. 28, lesser 22 mill.

Alt. 17, greater diam. 26, lesser 21½ mill.

Halmaheira, Ternate, Tidore and Moti, Moluccas; Angate, New Guinea.

H. lanceolata PFR., P. Z. S. 1861, p. 386, t. 37, f. 6; Monographia v, p. 328, 501.—v. MARTENS, Ostas. Exped. Landschn. p. 320, t. 17, f. 7.—DOHRN in Conchyl. Cab. p, 567, t. 168, f. 1, 2.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 117.

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H. GRATA Michelin. P. 13, figs. 50, 51.

Narrowly, obliquely perforated, pyramidal, acutely keeled in the middle; yellow, with a brown band above the keel and a wider one below it.

The shell is solid, with oblique delicate growth lines, and on the base microscopic spiral lines. The pyramidal spire is composed of 4¾ whorls, the earlier two shining, convex. Last whorl having an acute, compressed white peripheral carina; base convex; whorl not descending below the keel in front. Aperture oblique, sub-rhomboidal. Peristome yellow, broadly expanded, dilated at the columella into a wide vertical plate. Alt. 18, diam. 23½ mill.

Port Dorey, New Guinea; Island of Sorong, Mansinam and Jobi.

Carocolla grata MICH., in Guérins' Mag. de Zool. 1831, t. 9.—*Helix grata* FER. et DESH., Hist. i, p. 335, t. 63B, f. 1, 2.—PFR. Monogr. i, p. 325; Conch. Cab. p. 356, t. 136, f. 7, 8.—DOHRN in Contin. Conch. Cab. p. 595, t. 174, f. 12, 13.—TAP.-CAN., Ann. Mus. Civ. Genov. xix, p. 117, t. 6, f. 7; t. 8, f. 4, 10. Anatomy.—*Helix acuta* Q. & G., Voy. Astrol., Zool. ii, p. 98, t. 8, f. 1–4 (not of Lamarck).

The sulphur-yellow and brown coloration of this species is peculiar. It is variable in size and degree of depression.

H. PELECHYSTOMA Tapparone Canefri. Pl. 12, figs. 28, 29, 30.

Shell narrowly umbilicated, depressed trochiform, most acutely compressed-carinated, irregularly obliquely striated, under a lens seen to be minutely granulated; corneous-whitish, covered with a pale and deciduous epidermis. Spire depressed-conoid, rather acute. Whorls 5 or 5¼, nearly flat, separated by marginulated sutures; *last whorl deflexed in front*, the base convex, radiately striated. Aperture oblique, depressed, ax-shaped; peristome a little expanded, beaked at the carina; upper margin nearly straight, moderately reflexed, basal margin regularly arcuate, well reflexed; columella simple, dilated, nearly closing the narrow umbilicus. Alt. 11, greater diam. 25½, lesser 22 mill. (*Tapp. Can.*)

Pulo Faor, New Guinea.

H. pelechystoma T. C., Ann. Mus. Civ. Genov. xix, p. 120, t. 2, f. 21–23, 1883.

Intermediate between *H. vitrea* and *H. carinata*. It is more depressed than the former, the aperture more oblique, columella nar-

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rower, etc.; from the latter species it is separated by the smaller size and simple, not tuberculose, columella.

H. PENNANTIANA Pfeiffer. Pl. 10, figs. 81, 82.

Narrowly umbilicated, orbiculate-conoid, acutely carinated, thin, striatulate, irregularly and lightly malleated, unicolored fleshy, the apex reddish. Whorls 5½, a little convex, the last slightly descending in front, base nearly flat. Aperture very oblique, angulate-lunar, white inside; peristome roseate, broadly expanded, the basal margin reflexed, columella short, nearly covering the umbilicus. Alt. 20, greater diam. 37, lesser 30 mill. (*Pfr.*)

Habitat unknown.

H. pennantiana PFR., P. Z. S. 1845, p. 67; Conchyl. Cab. p. 432, t. 151, f. 1, 2; Monogr. i, p. .325—RVE., Conch. Icon. f. 123.

H. CARINATA Hombron & Jacquinot. Pl. 12, figs. 31, 32, 33, 34.

Narrowly umbilicate, depressed trochiform, irregularly striated, tawny; spire conoid, apex acute; suture light, subcrenate. Whorls 5½, moderately convex, rapidly increasing, the last very acutely carinated, the keel compressed and undulating. Aperture rhomboidal; peristome broadly expanded and reflexed, wavy-calloused inside; columella sloping, obsoletely bi-tuberculate. Alt. 18, diam. 43 mill. (*Pfr., descr. from figures.*)

New Guinea.

H. carinata HOMBR. & JACQ., Voy. Pol Sud, Zool. v, t. 7, f. 26–29.—ROSSEAU, text of same, p. 26.—PFR., Mon. iv, p. 254.

H. LEUCOTROPIS Pfeiffer.

Narrowly umbilicated, depressed, rather solid, closely striatulate, somewhat shining, flesh-colored; spire short conoidal; suture white-margined; whorls 4½, a little convex, the last having an acute, compressed white carina, slightly descending in front, base more convex. Aperture oblique, sub-rhombic-lunar, peristome thin, margins converging, the upper narrowly expanded, basal reflexed, dilated at the insertion. Alt. 8, greater diam. 18, lesser 15 mill. (*Pfr.*)

Aru Islands.

H. leucotropis PFR., P. Z. S. 1861, p. 22; Monogr. v. p. 407.—*Papuina leucotropis* WALLACE P. Z. S. 1865, p. 411.

An unfigured species, collected by Wallace.

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H. NODIFERA Pfeiffer. Pl. 13, figs. 34, 35.

Shell umbilicate, trochiform, acutely carinated, rather thin, striatulate, diaphanous, pale buff. Spire conoid, apex rather acute, suture lightly impressed; whorls 5, slightly convex, the last not descending, having an acute white keel in the middle, convex above and below. Aperture oblique, subrhomboidal, the peristome broadly expanded, margins subparallel, columellar margin narrowly vaultingly reflexed above the narrow umbilicus, and having a nodule on its inner edge. Alt. 18, greater diam. 30, lesser 24 mill. (*Pfr.*)

Island of Batchian, Moluccas.

H. nodifera PFR., P. Z. S. 1861, p. 21, t. 2, f. 4; Novit. Conch., p. 166, t. 45, f. 7, 8; Monogr. v, p. 328.—*Papuina nodifera* WALLACE, P. Z. S. 1865, p. 411.

Distinguished by the acute keel, nodiferous columella and light color.

(8.) GROUP OF H. LABIUM.

Umbilicate; depressed-trochoidal. not acutely keeled. New Guinea.

H. LITUUS Lesson. Pl. 10, figs. 77, 78.

Shell narrowly umbilicated, orbicular-conoid, apex obtuse, shining, buffish-brown or reddish-chestnut, encircled by a red or blackish zone; whorls 6, a little convex, the last rather flattened below. Aperture transversely ovate; peristôme broadly reflexed, blackish, or rosy within; basal margin straightened somewhat, forming an angle with the columellar margin, which is dilated, nearly closing the umbilicus. Alt. 25, greater diam. 37, lesser 29 mill. (*Pfr.*)

Port Dorey; Is. Sorong; Is. Jobi, Bay of Geelvink; Andai. Amberbaki, New Guinea.

H. lituus LESS. Voy. de la Coq. Zool., p. 309.—FER. & DH., Hist. i, p. 175, t. 106, f. 6–9.—PFR., Conchyl. Cab. p. 433, t. 151, f. 3, 4; Monogr. i, p. 326.—TAPP-CAN., Ann. Mus. Civ. Genov. xix, p. 138. 1883; l. c. 2d. Ser. iv, p. 137, 1887.—*H. ardouini* DESH., Encycl, Méth. Vers. ii, p. 266.—*H. papuensis* Q. & G., Voy. de l'Astrol, Zool. ii, p. 96, t. 7, f. 10–13.

There is considerable variation in this species, according to Tapparone Canefri. The shell is covered with a thin, pale corneous

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epidermis, which is readily deciduous. The measurements given by Canefri are as follows:—

Alt. 25, diam. maj. 37, min. 29; Alt. 21, diam. maj. 35, min. 27; Alt. 18, diam. maj. 26, min. 21 mill.

Var. *a*. Shell whitish-gray, peristome white. (*Dh.*)

Var. *b*. Shell whitish, girdled by a red line. (*Dh.*)

Var. *c*. Shell reddish-chestnut, with a broad blackish-brown peripheral band. (*Dh.*)

Var. *d*. Shell large, whorls more convex, spire more elevated, apex pallid, concolored; no peripheral zone. (*Tapp.*)

Var. *e*. Shells smaller, more globose, aperture less ovate, umbilicus more open, columellar lip less dilated, less covering the umbilicus; no peripheral band. (*Tapp.*)

H. LABIUM Férussac. Pl. 12, figs. 18, 19, 25, 26, 27.

Narrowly umbilicate, depressed, solid; spire low-conic, apex acute; whorls 5, the last obtusely angular at the periphery, not descending in front; surface shining, the growth-striæ fine, light; color light brown, lighter above, the periphery girdled with brown; Aperture transverse, wide, lip white, broadly reflexed all around, basal lip straightened, dilated at the insertion, partially concealing the deep, narrow umbilicus.

Alt. 20, greater diam. 33, lesser 25½ mill.

Port Dorey, Northern New Guinea; Island of Sorong.

H. labium FER., Hist., t. 64, f. 6.—PFR., Mon. Hel. Viv. v, p. 336.—DOHRN in Contin. Conchyl. Cab. p. 570, t. 168, f. 10, 11.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 140, 1883.

The peristome is very broadly reflexed, and is somewhat angled at the outer extremity. Wallace mentions a variety having no peripheral girdle, and paler in color. The specimens before me are larger than Férussac's figures, and somewhat less angular. They correspond well with Dohrn's figures. There is considerable variation in the degree of covering of the umbilicus.

This species has a more convex base than *H. lituus* and its other allies.

H. PSEUDOLABIUM Pfeiffer. Pl. 12, figs. 20, 21.

Narrowly umbilicated, conoid, obliquely striatulate, shining, thin, pale tawny, with a red girdle. Spire broad-conoidal, apex acute; whorls 6, slightly convex, the last rather depressed, the base, nearly flat; columella short, oblique. Aperture angular-lunar, whitish in-

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side, with a pellucid band; peristome thin, very broadly expanded, reflexed, white, the right margin angled, columellar margin half covering the umbilicus. Alt. 23, greater diam. 38, lesser 31 mill. (*Pfr.*)

Mindanao, Philippines (*?*)

H. labium PFR. (not Fér.) Monogr. Hel. Viv. i, p. 325; Conchyl. Cab., t. 55, f. 3, 4.—*H. pseudolabium* PFR., Monogr. v, p. 336.

Pfeiffer gives the locality *Mindanao, Philippines;* but the shell is apparently of the Papuan type and probably a New Guinea species. It differs from *H. labium* Fér. in the more conical spire and flatter base.

H. MULTIZONA Lesson. Pl. 10, figs. 83, 84, 85.

Shell umbilicate, depressed turbinate, rather thin, obliquely lightly striated, white, encircled with rufous zones; spire conoid, rather acute; whorls 5, a little convex, the last not descending, subdepressed, flattened on the base; columella sloping, obsoletely nodose; aperture oblique, transversely dilated, lunar; peristome broadly expanded, the columellar margin vaultingly reflexed, nearly covering the narrow umbilicus. Alt. 20, greater diam. 36, lesser 28 mill. (*Pfr.*)

Port Dorey, New Guinea; (and Waigiou Id. ?)

H. multizona LESS., Voy. de la Coquille, Zool., p. 308.—FER & DESH., Hist. i, p. 174, t. 106, f. 1, 2, 3, 5.—PFR., Conchyl. Cab., p. 363, t. 138, f. 7, 8; Monogr. i, p. 326.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 140, 1883.—*H. multizonata* DESH. in Lam., An. s. Vert. viii, p. 106.—*H. tenuiradiata* Q. & G., Voy. de l'Astrol. Zool. ii, p. 101, t. 8, f. 8–10.—*H. spectrum* RVE., Conch. Icon., f. 1424.

The synonymous *H. spectrum* is figured on pl. 6, fig. 10.

H. TAUMANTIAS Tapparone Canefri. Pl. 5, figs. 85, 86.

Narrowly umbilicated, orbiculate-conoid, obliquely striated, subpellucid, pale buff or reddish-tawny, with white lines above and a milk-white zone at the periphery (bordered with black or brown); base tawny; apex brownish, subacute. Whorls 5¾ (nearly 6), a little convex, having impressed obsolete spiral lines; last whorl large, not descending in front, the base flattened. Aperture lunate-elliptical; peristome white, expanded and reflexed throughout, the margins not approaching, joined by a pellucid, very thin callus; right

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margin regularly curved, basal margin narrowed somewhat, and nearly straight, forming an angle with the dilated columellar margin, which nearly closes the umbilicus. Alt. 22, greater diam. 33, lesser 26 mill. (*T. C.*)

Banks of the Fly River, Southern New Guinea.

H. taumantias T. C., Ann. Mus. Civ. Genov. xix, p. 141, t. 3, f. 13, 14 (shell); t. vi, f. 4; t. ix, f. 16, 18 (anatomy), 1883.

Resembles *H. lituus* in form, and *H. multizona* in coloration.

Form *a*. Shell a little larger, peristome rosy-violet.

Form *b*. Shell small, spire more raised, peristome rosy.

H. RIDIBUNDA Tapparone Canefri. Pl. 5, figs. 82, 83.

Narrowly umbilicated, orbiculate-conoid, obliquely striated, pellucid, buff, variously brown banded and lineate, and having a brown peripheral zone, which is sometimes bordered below with white. Base convex-depressed, variously banded and lineated with brown. Spire conoid, apex sub-acute, brownish; whorls 5½, a little convex, transversely sub-striate under a lens; last whorl large not descending in front. Aperture transversely lunate, sub-effuse; peristome rather narrow, margins expanded and reflexed, not approaching; right margin regularly curved, basal straightened, columellar margin moderately dilated and reflexed above the umbilicus.

Alt. 19, greater diam. 29, lesser 23 mill. (*T. C.*)

Banks of the River Fly, New Guinea.

H. ridibunda T. C., Ann. Mus. Civ. Genov. xix, p. 142, t. 3, f. 10, 11 (shell); t. vi, f. 5; t. viii, f. 17 (Anatomy) 1883.

Closely allied to *H. taumantias*, but smaller, the spire more elevated, the color and form of the lip different.

H. MEDITATA Tapparone Canefri. Pl. 5, fig. 84.

Narrowly umbilicated, globose-conoid, rather solid, subcarinate at the periphery; whitish-buff, variously lineated and banded with brown; base depressed; spire conoidal, the apex subacute, brownish. Whorls 5½, the last not descending. Aperture lunar rounded-ovate; peristome whitish, narrowly subreflexed throughout, the margins not approaching; right margin regularly curved, basal subcurved, columellar very much dilated and reflexed above the umbilicus. Alt. 15, greater diam. 21, lesser 17½ mill. (*T. C.*)

Katau, Southern New Guinea.

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H. meditata T. C., Ann. Mus. Civ. Genov. 1883, xix, p. 144, t. 3, f. 5 (shell); t. vi, f. 6 (Anatomy).

Closely allied to *H. ridibunda*, *H. taumantias* and *H. brazierœ*; but smaller than either, more distinctly carinated, and with a very broadly reflexed columellar lip.

H. AURORA Pfeiffer. Pl. 11, figs. 10, 11, 2.

Umbilicate, turbinate-depressed, rather solid, irregularly striatulate, little shining, unicolored brown; spire short conoidal, apex minute, rather acute. Whorls 4½, a little convex, the last carinated at the periphery, scarcely descending in front, a little convex below. Aperture oblique, wide, depressed-lunar, rosy and with a pearly luster inside; peristome pale rose or lilac-flesh tinted, the margins converging, upper lip horizontal, expanded, outwardly subeffuse; basal lip slightly arcuate, reflexed; columellar lip dilated, nearly closing the umbilicus. Alt. 17, greater diam. 30, lesser 24 mill. (*Pfr.*)

Waigiou Id.; Is. of Sorong and Ramoi, New Guinea.

H. aurora PFR., P. Z. S. 1862, p. 271; Novit. Conch. p. 207, t. 51, f. 9–11; Monogr. v, p. 341.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 145.—*Papuina aurora* WALLACE, P. Z. S. 1865, p. 411.

From the localities last given, Tapparone Canefri received a variety which is larger, without a peripheral carina, the aperture wide, peristome dilated, well reflexed, white; measuring, alt. 20, greater diam. 38, lesser 30 mill.

Specimens from Sorong measure: alt. 16, greater diam. 28, lesser 22 mill.

H. ÆROPE Smith. *Unfigured.*

Shell rather widely umbilicated, depressed trochiform, obtusely angulated at the periphery, pallid or whitish-brown, encircled with a narrow reddish zone about the middle. Whorls 5, a little convex, rather slowly widening, obliquely striated with delicate growth-lines; last whorl carinated, the carina sensibly disappearing toward the aperture, equally convex above and below, shortly descending in front, about the middle minutely rugose. Aperture transverse, lunate, whitish or pale lilac within; peristome white, dilated and reflexed, the columellar margin widely expanded.

Alt. 15, greater diam. 23½, lesser 19½ mill. (*Smith.*)

New Guinea.

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H. (*Papuina*) *œrope* E. A. SMITH, Ann. Mag. N. H. (6th ser.), vii, p. 452, May, 1891.

This species somewhat resembles *H. aurora* Pfr. in form, but is a trifle higher in proportion to the diameter. It also differs in being a smaller form, and in having a larger umbilicus. The young of this species is evidently sharply keeled at the middle, but in the adult shell the keel gradually disappears toward the aperture. (*Smith.*)

H. NOVOGUINEENSIS Pfeiffer. Pl. 5, figs. 89, 90, 91, 92.

Imperforate or narrowly perforate; globose-conical, solid, the spire conical, composed of 5½, slightly convex whorls; apex acute, pale; last whorl rounded at the periphery, slightly descending in front. Surface shining, striatulate, covered with a thin corneous epidermis, white under the epidermis, variously banded with chesnut, and with an opaque-white border below the suture, the base mostly chestnut. Aperture oblique, wide; lip white, broadly expanded throughout, reflexed; columellar margin wide, dilated over the umbilicus, usually closing it, and thickened within by a deposit of callus with an irregularly nodulous edge, more or less truncated below.

Alt. 26, greater diam. 41, lesser 34 mill.

Northern New Guinea; Island of Sorong.

H. novoguineensis PFR., P. Z. S. 1862, p. 270; Novit. Conch. p. 210, t. 56, f. 1, 2, 3, 4; Monogr. v, p. 276.—DOHRN, Contin. Conch. Cab. p. 567, t. 168, f. 3, 4.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix p. 146, t. 6, f. 8; t. 9, f. 3, 20 (Anatomy).—*Papuina novæguineensis* WALLACE, P. Z. S. 1865, p. 411.—*H. triumphalis?* TAPP. CAN. *l. c.* vi, 1874, p. 562; ix, 1876, p. 289.—? *H. triumphalis* REEVE, Conch. Icon. f. 1421, December, 1854.—*H. mysolensis* PFR., P. Z. S. 1862, p. 270; Novit. Conch. p. 206, t. 54, f. 7, 8; Monogr. v, p. 336.—TAPP. CAN. *l. c.* 2d. Ser. iv, p. 138, 1887.—*Papuina mysolensis* WALLACE, P. Z. S. 1865, p. 411.

A large, globose-conic shell, variously banded with chestnut, and having a white sutural border. The following seem to be merely varieties; *cf.* Dohrn, *l. c.*

Var. TRIUMPHALIS Reeve. Pl. 17, fig. 30.

Imperforate; broadly trifasciate with chestnut.

Reeve's name has priority over that of Pfeiffer, and I would adopt it for the species if the identity were established by an actual exami-

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nation of his type. This examination will sooner or later be made by someone, and the nomenclature revised if necessary.

Var. MYSOLENSIS Pfr. Pl. 7, figs. 29, 30.

Smaller and more elevated than the type; sub-perforate; having a broad basal and a narrow peripheral band.

Island of Mysol.

The specimen before me is larger than Pfeiffer's figures, but otherwise similar.

H. WAIGIOUENSIS H. Adams. Pl. 17, figs. 34, 35.

Subcovered perforate, depressed-turbinate, rather thin, plicate-striate; pale tawny, banded with white at suture and periphery, and ornamented with narrow reddish bands; spire conoidal, rather acute; whorls 5, a little convex, the last depressed-rounded, descending in front. Aperture very oblique, lunar-oval; peristome white, broadly expanded and reflexed, forming an angle with the columellar margin, which is dilated, reflexed above the perforation, and provided inside with an elongated tubercle. Alt. 21, diam. maj. 40, min. 32 mill. (*H. Ad.*)

Island of Waighiou.

H. waigiouensis H. AD., P. Z. S. 1865, p. 415, t. 21, f. 6, 7.—PFR., Mon. Hel. Viv. v, p. 339, 502.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 147, 1883.—*Papuina waigiouensis* WALLACE, P. Z. S. 1865, p. 411.

A large species, evidently closely allied to *H. novoguineensis.*

H. BRAZIERÆ Brazier. Pl. 5, figs. 93, 94, 95, 96.

Nearly covered perforate, solid, depressed turbinate, the periphery rounded; spire low-conic, composed of 4¼ convex whorls, the last descending in front, rather flattened beneath. Surface roughened by rude shallow, irregular spiral and oblique furrows and malleations. Color opaque white, the latter two whorls marbled and streaked irregularly with dark brown, the earlier whorls and apex bluish or corneous-white. Aperture very oblique, transversely oval, dark brown inside; the peristome is thin, expanded, white, baso-columellar margin reflexed, nearly concealing the umbilicus. Parietal wall and a spot at the insertion of the columella dark brown.

Alt. 19, greater diam. 25½, lesser 20½ mill.

Yule Island, Southern New Guinea.

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H. brazierœ BRAZIER, Proc. Linn. Soc. N. S. Wales, i, p. 107, 126, 1876.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 152, t. 4, f. 2; t. 5, f. 2 (shell); t. vii, f. 1; t. viii, f. 7, 13 (anatomy).

This shell is curiously mottled with dark brown; figures 93–95 are drawn from a specimen received from Brazier.

H. TOMASINELLIANA Tapparone Canefri. Pl. 7, figs. 27, 28.

Covered perforate, globose-turbinate, solid, sharply obliquely striate-crenulate; tawny, and under a subpearly epidermis having a number of brown-bluish bands and minute irregular spots; white at the suture. Spire conoid, vertex acute, brown. Whorls 4½, convex and separated by an impressed suture. Last whorl large, a little descending in front, subconstricted in the middle and then very obscurely subangulated, the base little convex. Aperture ovate, very oblique, the throat brownish-pearly; peristome white, margins converging, joined by a pellucid brown callus. Lip expanded and reflexed throughout, subflexuous above, the base little curved, columellar margin subarcuate, its base dentiform and truncate, brown spotted within, and expanded at the insertion above the umbilicus.

Alt. 23, greater diam. 36, lesser 29 mill. (*T.C.*)

On the River Fly, and at Katau, Southern New Guinea.

H. tomasinelliana T. C., Ann. Mus. Civ. Genov. xix, p. 148, t. 4, f. 1, t. 5, f. 1 (shell); t. 7, f. 3; t. 8, f. 6, 12 (Anatomy.)

Allied to *H. brazierœ*, but larger, flatter beneath, etc.

H. GESTROI Tapparone Canefri. Pl. 5, figs. 97, 98.

Covered perforate, globose-turbinate, solid, obliquely rudely striated, covered with a buff epidermis, under the epidermis white, sometimes ornamented with very obsolete pale-gray bands. Spire conoidal, apex acute, white. Whorls 4½, convex, separated by impressed sutures; the last whorl a little descending in front, convex below the sutures, then depressed, becoming convex and sub-angular at the periphery the base a little convex. Aperture transversely ovate, very oblique, throat white; peristome white, the margins converging and joined by a thin pellucid callus, expanded and reflexed throughout; basal margin nearly straight; columellar margin expanded at the insertion and nearly covering the umbilicus, its base truncated, tooth-like.

Alt. 26, greater diam. 34, lesser 29 mill. (*T. C.*)

Banks of the Fly River, Southern New Guinea.

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H. gestroi T. C., Ann. Mus. Civ. Genov. xix, p. 150, t. 4, f. 3; t. 5, f. 3 (shell); t. 7, f. 2, and t. 8, f. 5, 14 (Anatomy).

Differs from the preceding species in the more globose form, spire more elevated, base more convex, aperture less elliptical; in the pallid coloration and white interior of the aperture; the relative altitude of the last whorl; and in lacking the fine striæ which in the other species intersect the elevated striæ of the surface and render them crenulated.

H. SICULA Brazier. *Unfigured.*

Shell narrowly umbilicated, depressly globose, rather solid, finely striated; pale brown ornamented with three chestnut bands, two narrow and one broad contiguous to that at the suture; spire conoid, apex dark brown, obtuse, whorls 5, slightly convex, rounded at the periphery, convex at the base, ornamented with eight narrow spiral chestnut lines; aperture diagonal, roundly lunate, peristome rose-pink, slightly expanded and reflected columella dilated and reflected, concealing one-fourth of the umbilicus. *Var.* With chestnut band on the periphery, and running spirally around the suture to the apex. (*Braz.*) Alt. 13, greater diam. 20, lesser 16 mill.

Banks of Katau River, New Guinea.

H. (*Geotrochus*) *siculus* BRAZIER, Proc. Linn. Soc. N. S. Wales i, p. 106, 126.—*H.* (*Papuina*) *sicula* TAPP. CAN., Ann. Mus. Civ. Genov. xix, p. 153, 1883; *l. c.* 2d series, iv, p. 138, 1887.

Two specimens only were found; on trees.

H. MACLAYANA Brazier. *Unfigured.*

Shell covered with a thin yellowish-brown epidermis, umbilicated, depressly conoid, rather solid, obliquely plicately striated, everywhere minutely malleated, encircled with numerous spiral broken purplish-chestnut lines and whitish opaque patches; spire somewhat obtuse; whorls 4½ moderately convex, the two apical whorls smooth, white, the last large, convex, descending in front; suture impressed, having a narrow white line; below the suture blotches of purplish-chestnut; base convex having four spiral purplish lines slightly broken up into blotches; aperture very oblique, large, ovate, interior purplish-brown; peristome thickened, white, reflected, margins approximating, the right rather thin at the upper part; columellar margin thickened, broadly expanded and reflected covering half of the umbilicus.

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Only one specimen of this species was found. It has a thick, solid, white reflected lip 5 mill. broad, and the interior of an intense purplish-chestnut.

It also resembles, in its markings, *Helix Brazierœ* Braz., from Yule Is., and *Helix taumantias* Tapparone Canefri, from the Fly and Katau Rivers, New Guinea. (*Brazier.*)

Alt. 24, greater diam. 39, lesser 30 mill.

Maclay Coast, North-eastern New Guinea.

H. maclayiana Braz., Proc. Linn. Soc. N. S. Wales, x, p. 841, 1886.—*H. maclayana* Tapp. Can., Ann. Mus. Civ. Genov. 2d. Ser. iv, p. 138, 1887.

(9.) Group of H. flexilabris.

Imperforate, turbinate, the surface corrugated by oblique, forward-descending wrinkles. This group is very closely allied to the following one.

H. vexillaris Pfeiffer. Pl. 14, figs. 4, 65, 66, 67.

Imperforate, elevated, trochoidal, sculptured with rather coarse forward-descending wrinkles; opaque white above, the base olive or olive-brown.

The spire is conical, straight-sided; whorls 5½, slightly convex, the last bluntly angular at the periphery, rather flattened beneath, not descending in front. The surface has rather separated and coarse obliquely descending wrinkles, the base polished, with fine, subobsolete spiral striæ. Aperture very oblique, white within; peristome white, expanded, reflexed, the outer and basal lips narrow, columella white, long, sloping, dilated into a flat plate and appressed to the base, deeply inserted.

Alt. 22½, greater diam. 20, lesser 16 mill.

Alt. 21, greater diam. 20, lesser 17 mill.

New Georgia, Solomon Is.

H. vexillaris Pfr., P. Z. S. 1855, p. 113; Novit. Conch. i, p. 109, t. 31, f. 5, 6; Monogr. iv, p. 201.—Dohrn, Contin. of Conchyl. Cab. p. 593, t. 174, f. 5–7.—*H. phthisica* Pfr., P. Z. S. 1856, p. 383; Mal. Bl. 1856, p. 239; Novit. Conch. i, p. 110, t. 31, f. 7, 8; Mon. Hel. Viv. iv. p. 201.

The contrast between the olive base and white or bluish upper surface, and the coarse wrinkling are the more striking characters of this shell. Pfeiffer described the narrower form as a distinct spe-

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cies, but there is not the slightest ground for a separation. A specimen before me has an indistinct band above, and the columella and parietal wall are of a blackish-chestnut color (pl. 16, figs. 25, 26). Pfeiffer and Dohrn give *Admiralty Is.* as the locality of the species, but those before me are from the Solomons, and I am disposed to think the other locality doubtful, it being taken from the Cuming collection.

H. BOYERI Fischer & Bernardi. Pl. 13, figs. 48, 49.

Imperforate, trochiform, rather solid, obliquely striate and decussated with undulating, forward-descending striæ. Whitish and tawny clouded. Spire turbinate, rather obtuse, whorls 5½, convex, the last descending in front, sub-carinated and banded with white below the middle; base little convex. Aperture very oblique, subrhombic, white within; columella entering, compressed, flexuously sloping, surrounded with rosy; peristome white, right margin narrowly expanded, basal margin reflexed, forming an obtuse angle with the columella.

Alt. 22-23, greater diam. 27-29, lesser 22-23½ mill. (*F.&B.*)

Louisiade Islands.

H. boyeri F. & B., Journ. de Conchyl. v, p. 297, t. 9, f. 8, 9; Jan., 1857.—PFR., Monogr. iv, p. 201; v, p. 270.

H. PHÆOSTOMA Martens. Pl. 7, figs. 33, 34.

Imperforate, trochiform, thin, striatulate, obsoletely wrinkled-malleate, a little shining; isabelline, painted with zigzag streaks of blackish-brown, often interrupted; spire conical, elevated; whorls 5, a little convex, the earlier 2 unicolored, diaphanous-corneous, the third carinated at the suture, the last whorl rounded at the periphery and having a wide white band there; below the middle flattened and concentrically striolate. Aperture subdiagonal, elliptical, cut by the adjacent body-wall; peristome broadly expanded, basal and outer lips white, the columellar lip brown, dilated, appressed; throat brownish. Alt. 25, greater diam. 28, lesser 20½ mill. (*Mart.*)

New Hanover.

H. phæostoma v. MARTENS, Monatsber. k.-p. Akad. der Wissensch. zu Berlin, May, 1877, p. 276, t. 1, f. 10, 11; Novit. Conch. v, t. 144, f. 13, 14.

Allied to *H. gaberti* but rounded, not angular, at the periphery. Pfeiffer's figures of *H. gaberti* agree with this species in the rounded

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periphery, but they show no light zone at the circumference. As far as my specimens or the published figures show, *lambei*, *gaberti* and *phœostoma* have always a light peripheral zone. I am at a loss, therefore, to name the figures of Pfeiffer, which I have copied on plate 7, figs. 36, 37.

H. GABERTI Lesson. Pl. 7, figs. 35, 38, 39.

Imperforate, elevated trochiform, the spire conical, nearly straight-sided, composed of 6 whorls, the earlier two convex, whitish, forming a papillar or sub-globose nucleus, the remaining whorls but little convex, the last conspicuously angled at the periphery, slightly descending in front. Surface having light growth-lines and irregularly developed, fine, forward-descending wrinkles. Color pale-yellowish maculated with irregular, interrupted zigzags of chestnut-brown, often forming an irregular band below the carina.

Aperture very oblique, streaked and spotted with dark-brown inside; lip broadly expanded, white. Columella deeply entering.

Alt. 25, greater diam. 23, lesser 20 mill.
Alt. 27, greater diam. 22, lesser 18½ mill.
Alt. 22, greater diam. 22, lesser 18 mill.

New Ireland; New Guinea; Solomon Is.

H. (*Pileolus*) *gaberti* LESS. Voy. de la Coquille, Zool. ii, p. 314. —PFR., Monogr. i, p. 231.—REEVE, Conch. Icon. f. 100.—DESH. in Fer., Hist. p. 333, t. 106, f. 10–12.—v. MART., Monatsb. Preuss. Akad. Wissensch. zu Berlin, 1877, p. 276.—TAPP. CAN. Ann. Mus. Civ. Genov. xix, p. 138.—?*Geotrochus gaberti* WALLACE, P. Z. S. 1865, p. 412.—*H. trochus* Q. & G., Voy. Astrol. ii, p. 110; t. 8, f. 5–7.—*H. trochoides* DESH., in Lamk. viii, p. 122 (not *trochoides* Poir.)

A much more elevated shell than *H. lambei* and differing from *H. phœostoma* in being distinctly carinated. Pfeiffer's figures in the Conchylien Cabinet (copied on my Pl. 7 figs. 36, 37) do not seem to represent *gaberti*. They may perhaps indicate a new species between *gaberti* and *phœostoma*.

My figures are drawn from specimens from New Britian; I do not know whether the last two localities given above are to be depended on, but consider them somewhat doubtful.

H. LAMBEI Pfeiffer. Pl. 7, figs. 21–26.

Imperforate, depressed, wider than high, the spire low-conic, apex obtuse, corneous or brown; whorls 5½, slightly convex, the last wide,

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descending in front; carinated in front, becoming obtusely angular on the latter part; base rather flattened. Surface sculptured with fine, close, obliquely descending wrinkles. Color whitish, buff or rich brown, having a light zone at the periphery, and either *marked with dark brown, oblique zigzag stripes and spots* above and below, or having a band above and one below the periphery. Aperture very oblique, transverse-oval, white and showing the bands within, or of a uniform reddish-brown color, peristome broadly expanded throughout, reflexed, white or rarely reddish-brown.

Alt. 22, greater diam. 31, lesser 24 mill.

New Georgia, Solomon Is.; (and Admiralty Is.?)

H. lambei PFR., Malak. Bl. 1856, p. 239; Monogr. iv, p. 200.—DOHRN in Contin. Conchyl. Cab. p. 593, t. 174, f. 1–4.—*H. lombei* (error) PFR., P. Z. S. 1856, p. 382.

Allied to *H. gaberti* and *H. phœostoma*, but much broader and more depressed than either. Scarcely two individuals are marked alike. A common variation is shown in fig. 22, in which there are two bands but no zigzag markings. Fig. 25 represents a rarer form, in which the whole shell including lip is reddish-brown, with darker flammules. Of the large suite of specimens before me the more recently collected are from the Solomon Is. Two old trays (one from Cuming) are marked *Admirality Is.*, but this locality, although given by all writers above referred to, requires confirmation, in my opinion.

H. FLEXILABRIS Pfeiffer. Pl. 4, figs. 68, 69, 70, 71.

Imperforate, low-turbinate, the spire conical, last whorl rounded at the periphery, descending in front as far as the lower band; sculptured with very fine, close, forward-descending wrinkles; color creamy-white, with a chestnut-brown band above the periphery, ascending the spire, and another below the periphery. Aperture oblique, lip expanded, white.

The spire is composed of 6 rather convex whorls, separated by more or less distinctly impressed sutures. The last whorl descends in front as far as, or just below, the lower brown band. The bands are continuous and have smooth, well-defined edges; they are prominently seen within the aperture. The lip is broadly expanded, closely appressed in the vicinity of the umbilicus, which is covered by a thin white callus. The columella has a thickened edge, and a

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sort of obtuse fold near its insertion, which is rather deep in the axis (see fig. 69.)

Alt. 21, greater diam. 23, lesser 28 mill.

Alt. 26, greater diam. 27, lesser 19½ mill.

Solomon Is.

H. flexilabris PFR., P. Z. S. 1856, p. 382; Malak. Bl. 1856, p. 239; Mon. Hel. Viv. iv, p. 199.—DOHRN in Contin. Conchyl. Cab., p. 587, t. 172, f. 14, 15.

The locality given by Pfeiffer, *Admiralty Is.*, is probably erroneous. Three trays before me are from the Solomons. Figures 68, 69 are a little flatter than Pfeiffer's type. Numerous shells before me agree in characters; others are more elevated (figs. 70, 71), but I am unable to separate them specifically. There is considerable variation in the convexity of the whorls, but it is probably never so marked as in *H. coniformis*, which is from another island group, and doubtless distinct specifically.

There is a translucent-bluish patch around the columella, faint, but well-defined against the opaque cream ground-color of the shell. This occurs also in *H. gamelia*. All of the specimens seen are two-banded.

H. CONIFORMIS Férussac. Pl. 4, figs. 78, 79; pl. 17, fig. 43.

Imperforate, orbiculate-conic, smooth, whitish-brown, ornamented with brown bands which are often articulated. *Suture deep;* whorls 5, convex, the last flattened beneath, descending in front. Aperture very oblique, large, oval; peristome thin, white, broadly expanded, the margins converging, basal lip reflexed, columellar lip dilated, appressed. Alt. 18, greater diam. 24, lesser 18 mill. (*Pfr.*)

Port Pralin, New Ireland.

H. (*Helicostyla*) *coniformis* FER., Hist. t. 108, f. 1.—*H. coniformis* DESH. in Lam., An. s. V. p. 103;—PFR., Monogr. i, p. 229; Conchyl. Cab. p. 435, t. 151, f. 9, 10.—REEVE, Conch. Icon. f. 101.—*H. turbinata* DESH., Encycl. Méth. ii, p. 265.—*H. tuffetii* LESS., Voy. de la Coquille, p. 313, t. 10, f. 3.

The whorls are more convex than in *H. flexilabris*, and the bands are often articulated. Pl. 17, fig. 43, is one of Férussac's original illustrations.

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Var. TUFFETII Lesson. Pl. 17, fig. 42.

Has the contour of typical *coniformis*, but the color is a uniform, intense blue-black; lip bluish-white.

"Makakabat," New Ireland.

H. SELLERSI Cox. Pl. 15, fig. 75.

Shell imperforate, trochiform, brownish-yellow, generally ornamented with two very dark-chestnut, almost black, bands, more or less wide, one above and one below the sub-carinated periphery of the last whorl, having sometimes between them an opaque-white band; transversely rather regularly striated backwards, decussated from behind forwards by rather irregular slightly waved proportionally broadly separated striæ, more distinct on the last two whorls than at the apex of the spire, whorls 5, rounded, gradually increasing in size, suture impressed, last whorl sharply depressed at its termination and flattened from the periphery to its insertion; spire obtuse; aperture ovately lunate; peristome white margined, slightly everted; columella very slightly dilated and adnate.

Diam. greatest 0·78, least 0·56; height 0·60 of an inch. (*Cox.*)

Guadalcanar Is., Solomon Islands.

H. sellersi, Cox, P. Z. S. 1871, p. 646, t. 52, f. 9.—? *H. sellersi* DOHRN, Conchyl. Cab. p. 585, t. 172, f. 9–11.

(10) GROUP OF H. BRUMERIENSIS.

Imperforate, turbinate or trochoidal, the last whorl descending in front. Surface spirally striate or having forward-descending wrinkles. Lip more or less sinuous above, often vividly colored. Australia, New Guinea, Louisiade Is.

This group comprises a considerable variety of forms, but they are so connected by intermediate species as to form a perfectly natural assemblage.

H. CHAPMANI Cox. Pl. 1, fig. 13.

Shell elevated-conic, imperforate, white; the lip inwardly purple-brown, at the edge deep red.

Whorls 5½, a little convex, obliquely roughly and closely striated, and sculptured with flexuous growth-lines. Last whorl obtusely angulated in the middle, slightly convex beneath, shortly descending in front. Aperture oblique, irregularly subquadrangular, white within; peristome somewhat thickened and expanded, shortly reflexed, the outer margin obtusely angulated a little above the

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middle; columella broadly dilated, appressed, flattened, lilac-colored at its inner margin, united with the outer lip by a blackish-brown parietal callus. Alt. 34, diam. 32 mill. (*Smith.*)

Rossel Island, Louisiade Group.

H. (*Geotrochus*) *chapmani* Cox, Proc. Linn. Soc. N. S. Wales, iv, p. 115, t. 16, f. 2, 1879; *l. c.* 2d ser. ii, p. 1063, t. 2, f. 10, 11.—*H.* (*Acavus*) *coraliolabris* E. A. Smith, Ann. Mag. N. H. 5th series, xix, p. 419, t. 15, f. 4, June, 1887.

This species is so well defined by the remarkable contrast of the color of the peristome with the white tint of the rest of the shell, that it will be readily recognized. The edge of the aperture is thickened and bright coral-red, and this, both within and without, is rather deeply bordered, especially within, with purple-brown. (*Smith.*)

The description is from Smith. The identity of *coraliolabris* with *chapmani* cannot be questioned.

H. brumeriensis Forbes. Pl. 1, figs. 6, 7, 8.

Imperforate, globose-conic, thin but solid, opaque white, the lip intensely black, Surface lusterless, with rude, irregular lines of growth, obsoletely granulated by spiral lines. Aperture very oblique, white within; upper lip roundly expanded, sinuated, basocolumellar lip flat, broad, adnate for one-third the distance from center to periphery.

The shell is globose with short spire, consisting of 4 rather convex whorls. Suture impressed. Last whorl not angled at the periphery, descending in front. The black border of the lip is very wide, extending several millimeters back of the expanded portion. Alt. 25, diam. 28 mill.

Eastern New Guinea, on the shores of the Gulf of Huon; Millport Harbor, near Amazon Bay; Brumer Id., Louisiade Group.

H. brumeriensis Forbes Voy. Rattlesnake, Append. p. 375, t. 2, f. 1.—Pfr. Monogr. iii, p. 189.—Reeve, Conch. Icon. f. 1448.—Tapp. Can. Ann. Mus. Civ. Genov. xix, p. 156.—Angas, P. Z. S. 1876, p. 489.—Smith, Ann. Mag. N. H. 5th ser., xix, p. 419, 1887.

A white, lusterless shell with deep black lip. Although this species is placed in *Acavus* by Tapparone Canefri and some others, it is a true *Papuina*, closely allied to *H. diomedes*, *zeno*, *naso*, etc., differing mainly in the rounded instead of angular periphery.

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New Guinea specimens are larger than those originally described, and sometimes more conically elevated. Smith's measurements are: alt. 33, diam. 38 mill. This is larger than any I have seen. The aperture is sometimes pale rose tinted inside. See Smith, *l. c.*

H. RANGII Lesson. (H. EXTRICANDA Tapp. Can.)

Shell suborbicular, globulose, ventricose, imperforate, convex, the last whorl of the spire much swollen, very ventricose, rounded in every part. Lips thick, bordered, the left margin dilated, covering the umbilicus with a smooth plate. The mouth is rounded, the peristome level and convex. The earlier whorls of the spire are small, convex, united by a very delicate suture. The shell is entirely covered with excessively fine interrupted striæ, which viewed under a lens are seen to be composed of regular, elevated arêtes, forming a shagreened surface.

This helix is thick, robust, with a diameter of 18 lines [33 mill.], alt. 13–14 lines [26–28 mill.]; of a clean bright-chestnut color, the greater portion of the base being of a lighter tint. It has great resemblance in form and size to *H. melanotragus*. (*Lesson.*)

Port Dorey, New ~~Zealand~~. Guinea

H. rangii Less., Voy. de la Coquille, Zool. ii, p. 305 (not of Desh.; not *rangiana* Fér.).—*H. extricanda* Tapp. Can., Ann. Mus. Civ. Genov. xix, p. 156, 1883.

This species is known only by the original description translated above. The color of the lip is not stated. Later collectors in New Guinea have not found a shell agreeing with it. The comparison with *H. melanotragus* suggests an affinity to the group of *H. brumeriensis, zeno*, etc.

Accepting the synonymy given by Dr. Pfeiffer as probably founded upon some knowledge of this form not given in the description, I placed the name in the synonymy of *Hadra lessoni* (Manual VI, p. 163), but not without expressing a doubt as to the propriety of such reference. It should be erased from that place.

H. ZENO Brazier. Pl. 1, figs. 1, 2, 3, 4.

Imperforate, depressed trochiform, the spire low-conic, apex obtuse, whorls 4½; the last obsoletely angular at the periphery, very deeply deflexed toward the aperture. Surface densely, finely and irregularly granulated by the decussation of spiral and oblique striæ. Color white, becoming lilac on the spire, the last whorl en-

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circled by numerous chestnut bands, which are sometimes confluent above and below the white peripheral girdle, giving the effect of a nearly unicolored chestnut shell. Aperture very oblique, rosy or lilac-white inside; peristome expanded, thickened, black; columellar margin broad, flattened, black, its inner edge lilac colored.

The shell is solid, strong, the apical whorl dark. The last whorl has a carina at its origin, which becomes rounded on the latter part of the volution. Alt. 27, diam. 34. mill.

Hall Sound; Along Laloki or Goldie River; Mount Astrolabe, Southern New Guinea.

H. zeno BRAZIER, Proc. Linn. Soc. N. S. Wales, i, p. 107, 1876; *l. c.* ix, p. 805, 1884.—*H. latiaxis* E. A. SMITH, Ann. Mag. N. H. 5th. Ser., xi, p. 191; *l. c.* xix, p. 420, t. 15, f. 7, 1887.

This large species differs from *H. diomedes* in being less acutely keeled and different in color. The specimens before me show that *H.* (*Acavus*) *latiaxis* Smith is a synonym. They vary much in coloring, and in degree of carination. Fig. 1 represents Mr. Smith's type; the other figures are drawn from specimens received from Mr. Brazier.

H. DIOMEDES Brazier. Pl. 1, figs. 9, 10.

Imperforate, trochiform, acutely keeled, solid, opaque. Surface cut into minute granules by oblique and spiral striæ; lusterless white, with irregular radiating patches or streaks and spiral interrupted bands of purplish-pink. Aperture very oblique, pink within, the lip intensely black, thickened within, upper margin expanded, basal margin flatly, broadly expanded, columellar margin broad, flat, adnate to the base for about half the distance from center to periphery.

The shell is rather thin but solid. Spire straightly conical, composed of 4¾ whorls, the earlier 1½ rounded, dark purple, the following flattened; last whorl acutely keeled, rather deeply descending in front. Aperture oblong-triangular, the upper lip sinuous.

Alt. 26, diam. 32 mill.

Constance Island, New Guinea.

H. diomedes BRAZIER, Proc. Linn. Soc. N. S. Wales ii, p. 121, 1878.—TAPP. CAN., Annali Mus. Civ. Genov. xix, p. 122, t. 3, f. 12, 1883.

A beautiful species, intermediate in form between *H. brumeriensis* and *H. zeno*, but perfectly distinct from either. It is even more

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closely allied to *H. naso*, the coloration of some specimens of the two species being identical.

My description and figures are from a specimen received from Mr. Brazier.

H. MACGILLIVRAYI Forbes. Pl. 3, figs. 38, 39.

Imperforate, trochiform, the spire straightly conic, periphery carinated, base rather flattened; of an opaque fawn or fleshy-brown tint, occellated with small translucent dark dots, irregularly bestrewn; apex purple-black; lip white, sinuous.

Surface conspicuously decussated with oblique and spiral striæ, the latter stronger impressed. Spire straightly conical, whorls 5½, slightly convex, the last angulated at the periphery, rather abruptly descending in front. Aperture very oblique, light brown and dotted within; upper margin of peristome bent downward, bisinuate; basal margin narrowly reflexed, adnate toward the center; a dark brown spot at the root of the columella. The lip is bordered outside with creamy, behind which there is a blackish stripe.

Alt. 20, greater diam. 20½, lesser 18 mill.

Fitzroy and Frankland Is. off N. E. Australia; and on the mainland 28 miles inland from Cardwell, Rockingham Bay (alt. 3500 ft.)

H. macgillivrayi FORBES, Voy. H. M. S. Rattlesnake, ii, p. 337, t. 3, f. 1—REEVE, Conch. Icon. f. 357.—COX, Monogr. Austr. L. Sh. p. 62, t. 2, f. 12.—PFR., Monogr. iii, p. 168; Conchyl. Cab. t. 140, f. 1, 2.—BRAZIER, Proc. Linn. Soc. N. S. Wales, i, p. 125; Jour. of Conchol., Leeds, i, p. 269, 1887.—HEDLEY, Proc. Roy. Soc. N. S. Wales, v, p. 63.—TRYON, *l. c.* p. 135, 1888.

A beautiful species, allied to *H. naso* and some other Papuan species in form of the lip, but totally different in sculpture and coloring.

H. BIDWILLI Pfeiffer. Pl. 3, figs. 52, 53.

Imperforate, elevated-trochiform, the spire straightly conic, periphery keeled, base flat; lusterless whitish, irregularly spotted with chestnut above, the base chestnut, spotted with white; peristome dark chestnut.

The surface is decussated by very fine oblique and spiral striæ, and besides is very obsoletely obliquely wrinkled. Whorls 5½, nearly flat, the last angular, a little descending in front, flat below, contracted at the aperture. Aperture very oblique, somewhat angled at the position of the carina, pinkish-brown within; peristome edged

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with blackish-brown, outer margin not expanded nor thickened, basal margin narrowly expanded, columellar margin arcuate, reflexed and closely appressed. Parietal wall dark brown.

Alt. 18½, greatest diam. 16½, lesser 15 mill.

Maryborough, Ipswich, Pimpama and Burnett River, Queensland; Richmond River, N. S. Wales, Australia. On trees.

H. bridwilli PFR., P. Z. S. 1853, p. 49; Monogr. iii, p. 644.—REEVE, Conch. Icon., f. 1034.—*H. bidwilli* Cox, Monog. Austr. Land Sh., p. 63, t. 2, f. 3.—PFR. Nomencl. Hel. Viv, p. 193.—HEDLEY, Proc. Roy. Soc. Queensl. v, p. 62, and p. 135, 1888.

The name was mis-spelled by Pfeiffer in his earlier publications, but the strict rules of nomenclature may perhaps be "more honored in the breach than in the observance," in this case; and I have therefore, accepted Cox's emendation.

H. NASO Martens. Pl. 2, figs. 32, 33, 34, 35.

Imperforate, depressed-trochiform; spire conic or concave-conic; last whorl conspicuously carinated in the middle, abruptly and deeply descending to the aperture. Sculptured with inconspicuous growth-lines and finely obliquely corrugated in a direction at right angles to the lines of growth. White or rosy-white, having spiral bands or irregular radiating patches of purplish-rose color above. Aperture very oblique, rosy-white inside, the parietal wall blackish; *lip black, its upper margin forming two high arches, produced downward between them in an acute triangular lobe;* columellar lip broad, adherent to the base.

There are nearly five whorls, the earlier one or two pink or purple with a sutural white band. The last half of the body-whorl is somewhat narrowed, the keel becoming more obtuse; it is very strongly swollen just behind the aperture. The lip is broadly black-bordered. Alt. 21, diam. 31 mill.

Taburi, Astrolabe Bay; Mt. Astrolabe, Southeast New Guinea.

H. naso v. MART., Jahrb. D. M. Ges. x, p. 82, 1883.—*H. tapparonei* E. A. SMITH, Ann. Mag. N. H. (5th ser.,) xi, p. 190, March, 1883.—TAPP. CAN., Ann. Mus. Civ. Genov. xxiv, p. 133.

A beautiful species, peculiar in the bisinuate black lip. It represents a line of differentiation intermediate between *H. diomedes* and *H. tayloriana.* The specimens before me (figured on plate 2) exhibit considerable diversity in color-pattern. Although published

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in the same year, the name *naso* has about a month priority over *tapparonei*.

H. RHYNCHONELLA Tapparone Canefri. *Unfigured.*

Imperforate, thin, depressed-trochiform, carinated, obsoletely longitudinally striated and obliquely spirally roughened; shining, violaceous above, buff beneath, painted all over with brownish-purple flames and spots disposed in bands. Spire conoidal, apex brown, whorls 5 ?, the upper ones plane, the last whorl large, somewhat convex, at the periphery acutely carinated, at the carina subexcavated; base convex, with narrow spiral bands of brownish-purple. Aperture very oblique, produced into a beak, wider than high, the throat pale-rose; peristome blackish-purple, moderately reflexed, the upper margin deeply sinuated forward, basal margin sub-angulated in the middle, columellar margin sub-dilated.

Alt. 18, greater diam. 32, lesser 24 mill. Aperture, width 19, alt. 12 mill. (*Tapp. Can.*)

Ansus, Island of Jobi, New Guinea.

H. rhynchonella TAPP. CAN., Annali Mus. Civ. Genov. xxiv, (2d. Ser. iv), p. 134, 1887.

Has much resemblance to *H. tayloriana*, but is larger, the inflection of the upper lip more marked, and the coloration different.

H. HERO Smith. *Unfigured.*

Shell rimate, depressed-trochiform, rather thin, acutely carinated in the middle; whitish, ornamented above with oblique, opaque buffish subzigzag lines, below with a few concentric brown and opaque buff zones. Whorls 4½, the upper a little convex, closely spirally striate and having oblique lines of growth, the last whorl less convex, similarly striated, but minutely rugose forward, shortly descending, lightly depressed before the middle of the lip, at the periphery having an acute, buff carina, beneath radiately and concentrically subrugosely striated. Aperture very oblique, subrostrate, colored the same inside as out; peristome white or pale lilac above, upper margin lightly reflexed, depressed in the middle, lower margin widely expanded, white, dilated above the umbilicus, nearly closing the rimation. Alt. 16½, greater diam. 28, lesser 22 mill. (*Smith.*)

New Guinea.

H. (*Papuina*) *hero* SMITH, Ann. Mag. N. H. 6th series, vol. vii, p. 45, May, 1891.

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The apical whorls of this very pretty species and the region around the umbilicus are opalescent white and devoid of the oblique markings and bands. In the type, the upper terminations of the brownish, oblique, irregular stripes on the body-whorl are almost of a reddish tint, and form, as it were, a series of spots at the suture. A variety is of a uniform opalescent or greenish-white color, variegated above with the radiating, somewhat zigzag, opaque, deep cream-colored markings, which on the lower surface assume the form of zones and irregular spots or blotches. In form this species bears some resemblance to *H. tayloriana* Ads. & Rve. (*Smith.*)

H. IANTHE Smith. *Unfigured.*

Shell depressed-trochiform, narrowly rimate, acutely carinated at the periphery, entirely white, sculptured with delicate oblique lines of growth. Whorls 4, the upper a little convex, the last slightly concave above and below the carina, scarcely descending in front. Aperture oblique, subquadrate, acuminate at the carina; peristome slightly reflexed above, broadly expanded below, the columellar margin widely dilated, nearly closing the umbilicus. Spire short-conic, obtuse at the apex. Alt. 13½, greater diam. 25½, lesser 21 mill. (*Smith.*)

New Guinea.

H. (*Papuina*) *ianthe* E. A. SMITH, Ann. Mag. N. H. 1891, p. 452.

In form this species is very like *H. hero*, but more obtuse at the apex, and the aperture is not quite so acuminate. It differs also from that species in the absence of color-markings and spiral striæ. The last whorl also is a trifle narrower, and does not descend in front. (*Smith.*)

H. TAYLORIANA Adams and Reeve. Pl. 17, figs. 40, 41; pl. 2, figs. 20, 21, 27.

Imperforate, trochiform, thin, the spire conic; apex mammillar, obtuse, whorls 5, the last acutely keeled, abruptly deflexed in front. Surface shining, finely obliquely roughened and corrugated by obliquely descending, anastomosing impressed lines. Cream colored, becoming flesh-tinted on the spire, and yellower toward the latter part of the body whorl, more or less closely speckled and obliquely streaked with pinkish-brown above, the base having a band of the same color, obsolete in front of the mouth, where there is a tract tinted with pink, which extends inward on the parietal wall; *carinal*

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band white or cream colored; the whole interior of the mouth being pink, *except a broad white band at the position of the carina;* lip *deep purplish or brownish-black,* bisinuate above, prominently beaked at the keel, reflexed below, columellar lip sloping, adnate to the base.

Alt. 17, diam. 26 mill. (typical form).

Alt. 13, diam. 20 mill. (var. *yulensis*).

D'Entrecasteaux Is.; Southern New Guinea, at South Cape; Laloki (or Goldie) River, foot of Mt. Astrolabe; foot of Owen Stanley Ranges, and Yule Island.

H. tayloriana ADAMS & REEVE, Voy. Samarang, Moll. p. 59, t. 15, f. 2.—REEVE, Conch. Icon. f. 524.—E. A. SMITH, Ann. Mag. N. H. 5th ser., xix, p. 421, 1887.—*H. yulensis* BRAZIER, Proc. Linn. Soc. N. S. Wales, i, p. 105, 1876.—TAPP. CAN., Ann. Mus. Civ. Genov. xix, p. 123, t. 3, f. 2; t. vi, f. 1; t. viii, f. 11 (Anatomy).—Cox, Proc. Linn. Soc. N. S. Wales, 2nd ser. ii, p. 1063 t. 2, f. 5, 6; 1888.

This species is closely allied to *H. strabo*, but apparently constantly separated by the creamy peripheral band and deep purplish-black peristome. The type is figured on pl. 17, figs. 40, 41.

The variety called *yulensis* by Brazier (pl. 2, figs. 28, 29, 30, 31) is smaller, with the "spout" of the aperture less developed. It must however be regarded as a variety or form of the *tayloriana*.

H. ALBOCARINATA Smith. Pl. 1, fig. 5.

Short-conical, imperforate, thin, semi-pellucid, pale corneous, encircled by an opaque-white carina; whorls 5, moderately convex, obliquely roughly striate, the last whorl acutely keeled at the periphery, sculptured below with rugose concentric striæ, ornamented with few, interrupted, white opaque lines, shortly descending in front, margined with buff or milk-white behind the lip. Aperture oblique; peristome white, narrowly expanded and reflexed, outer margin sinuous, columellar margin thickened, appressed parietal callus thin. Alt. 17, greater diam. 24, lesser 20 mill. (*Smith.*)

South Cape, New Guinea.

H. albocarinata SM., Ann. Mag. N. H. 5th. Ser. xix, p. 423, t. 15, f. 12, 1887.

The central keel is rather sharper and the texture more transparent than in *H. tayloriana*, but it may prove to be an albino form of that species.

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H. STRABO Brazier. Pl. 2, figs. 22, 23 (*typical*); figs. 17, 18, 19, 24, 25, 26 (*var.*).

Imperforate, low-trochiform, spire conical, apex obtuse; whorls 4½, the last one acutely carinated, slightly deflexed in front. Surface shining, obliquely, finely and irregularly corrugated, as in *H. tayloriana*. Color creamy-white, unicolored or with spiral bands, the parietal wall and base in front of the aperture flushed with pink. Aperture very oblique; *lip broadly bordered with pink* (or purple), bisinuate above, produced into a "spout" or beak at the keel, expanded below, the columellar margin adherent to the base.

Alt. 18, diam. 30 mill.

Southern New Guinea at Katau River, and Maclachie Point.

H. strabo BRAZIER, Proc. Linn. Soc. N. S. Wales, i, p. 106, 1876. —*H. roseolabiata* E. A. SMITH, Ann. Mag. N. H. xix, p. 421, t. 15, f. 2.—*H. katauensis* TAPP. CAN., Annali Mus. Civ. Genov. xix, p. 126, t. 3, f. 1, 3; t. vi, f. 3. (Anatomy).

Distinguished from the closely allied *H. tayloriana* by its rosy or lilac-purplish lip, absence of a well-defined peripheral white girdle, and general pattern of coloring. The apex is either black, corneous or white. The following color-varieties have but slight claims to even varietal rank; the large series before me showing great variations in color-pattern, as well as typical examples of the several described forms.

The typical *strabo* (pl. 2, figs. 22, 23) is unicolored creamy-white with rose-pink lip. Four of the specimens before me have the lip purple.

Form *roseolabiata* Smith (pl. 2, figs. 17, 18). Creamy-white; apical 1½ whorls blue-black; periphery girdled with a sharply defined brown band, another band bordering the suture; lip rosy. Ferguson Island, D'Entrecasteaux Group.

Form *katauensis* Tapp. Can. (pl. 1, figs. 14, 15; pl. 2, figs. 24, 25, 26). Variously obliquely streaked *and having spiral bands* of purplish-brown; lip pink.

H. RHOMBOSTOMA Pfeiffer. Pl. 16, figs. 14, 15.

Imperforate, trochiform, rather thin, obliquely striatulate, subdecussated with very close concentric lines, rather shining, whitish-tawny, ornamented with a number of chestnut bands; spire short, conic; apex acute. Whorls 5, rather flat, the last acutely carinated, slightly convex beneath, little descending in front; peristome

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violaceous, upper margin expanded, impressed above, columellar margin straightened, dilated, flat, appressed. Alt. 15, greater diam. 28, lesser 23 mill. (*Pfr.*)

Habitat unknown.

H. rhombostoma PFR., P. Z. S. 1845, p. 72; Monogr. i, p. 231.—RVE., Conch. Icon., f. 1456.

This form has not been noticed by recent writers. It is apparently intermediate between *H. strabo* Braz. and *H. louisiadensis* Forbes, approaching rather near to the var. *katauensis* of the former. Should be looked for in Southern New Guinea and adjacent islands.

H. GURGUSTII Cox. Pl. 1, fig. 16; Pl. 14, figs. 68, 69.

Shell imperforate, broadly conoid, white, diaphanous, opaque, shining, granular on the surface, whorls five, gradually increasing in size, flat, last sharply angled at the periphery, pinched and everted at the peristome, reflexed at the insertion; base flat; peristome bright-pink, lunately elongated, margins approached, everted and beaked at the center; aperture white within.

Diam. greatest 1·10; least 0.84; height 0·80 of an inch.

This fine species is in the Hargravesian Collection in the Australian Museum; it is the same kind of shell as *Helix Louisiadensis* of MacGillivray, but is a larger species, easily distinguished from that species by its white diaphanous aspect, light-pink peristome and by the absence of the characteristic oblique fine striæ on the surface of the whorls. (*Cox.*)

Russell Island, Louisiade Group.

H. (*Geotrochus*) *gurgustii* Cox, Proc. Linn. Soc. N. S. Wales, iv, p. 114, t. 16, f. 1, 1879; *l. c.* 2d. Ser. ii, p. 1063, t. 2, f. 3, 4.

H. LOUISIADENSIS Forbes. Pl. 4, figs. 61, 62, 63.

Imperforate, depressed-turbinate, about equally convex above and below the periphery; spire low-conic, apex obtuse; whorls 4½–4¾, slightly convex, the last whorl *somewhat angulated in front*, becoming rounded, *abruptly deflexed to the aperture, a little constricted behind the pink lip.*

Surface shining, obliquely striatulate, and *covered with a close fine sculpture of forward-descending wrinkles.* Ground-color, corneous-white or pink, *having an opaque-white peripheral girdle, above obliquely streaked in a very irregularly broken pattern* with light brown;

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streaked and indistinctly spirally banded with the same shade below the peripheral zone. Earlier whorls unicolored, corneous or whitish.

Aperture oblique, peristome pink, *its face thickened, convex;* narrowly expanded, reflexed, *sinuous above;* columella arcuate, adnate, with no tooth or fold. Alt. 18, greater diam. 21, lesser 17½ mill.

Sudest Id., Louisiade Is.

H. louisiadensis FORBES, Voy. Rattlesnake, appendix, p. 376, t, 2, f. 8.—PFR., Monogr. iii, p. 174.—REEVE, Conch. Icon. f. 1449.—*H. millicentæ* COX, P. Z. S. 1871, p. 323, t. 34, f. 2, 2a; *l. c.* 1873, p. 566.—PFR. Monogr. vii, p. 313.—*H. Thomsoni* E. A. SMITH, Ann. Mag. N. H. 1889, p. 202, t. 13, f. 12, 13.

This species has the lip like *H. fringilla*, but the spire is conical and the surface finely wrinkled. Slightly differing varieties occur on the different islands.

Var. MILLICENTÆ COX. Pl. 4, figs. 64, 65.

Differs from the type in having the lip white, and more produced forward above.

Var. THOMSONI Smith. Pl. 7, figs. 31, 32.

Imperforate, subconic-globose, rosy-purple, spotted and variegated with pale buff, closely sculptured with lines of growth, and minutely obliquely corrugated; whorls 4½, a little convex, rapidly widening, separated by simple sutures, the last whorl at first carinated, the carina becoming obsolete, at the aperture suddenly deflexed, constricted behind the lip; aperture oblique, elongated, rosy-purple inside; peristome whitish, expanded and reflexed, upper margin sinuated forward; columellar margin appressed, obliquely rectilinear within. Alt. 18, greater diam. 27, lesser 20 mill. (*Smith.*)

Var. Shell subdiaphanous, varied and spotted with buff.

St. Aignan, Louisiade Group.

H. WOODLARKIANA Souverbie. Pl. 3, figs. 42, 43.

Imperforate, semiglobose, obliquely striate, very finely granulose-malleate, here and there very obsoletely spirally striate; rather thin, shining, subtranslucid, violaceous, darker at the apex, paler at the umbilical region, having four whitish bands, the three upper more or less interrupted and brown, the fourth is wider and continuous, at the periphery. Circum-umbilical area paler, having three narrow, ill-defined whitish bands. Whorls 4, convex, the suture impressed, the last whorl carinated, more convex beneath, a little descending in

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front, subconstricted behind the whitish-yellow lip. Aperture concolored within, oblique, subrhombic-lunar; peristome acute, white, superior margin arched forward, subreflexed, becoming more reflexed toward the columella, which suddenly becomes appressed to the base, and is of a rosy (slightly violet) color. Alt. 14½, greater diam. 19½, lesser 15 mill. (*Souv.*)

Woodlark Island, Louisiade Group.

H. woodlarkiana SOUV., Journ. de Conchyl. 1863, pp. 76, 172, t. 5, f. 2.—PFR., Monogr. v, p. 271.

H. GORENDUENSIS Brazier. *Unfigured.*

Shell imperforated, trochus-shaped, rather thin, obliquely, finely striated and transversely wrinkled, flesh tinted or cream color; ornamented with pinkish opaque spots and dots; spire rather conoid; whorls 5, convex, the last more convex, the first three apical whorls dark rose-pink, the fourth a little lighter in color, the fifth slightly keeled in front, cream colored, and marked with opaque pinkish spots and dots, base convex, sculptured same as above; aperture triangular, very much produced and contracted in front, constricted behind the aperture, interior bright pink, peristome blackish-purple, slightly reflected; the right margin descending in front, columellar margin flattened and expanded, tinged with brown, margins joined with a thin pink callus entering spirally into the interior of the aperture.

Two specimens of this very pretty species were found by Baron Miklouho-Maclay. One was dead and weatherbeaten, the other was found with the animal alive. The Baron informs me that the animal was black, and that the back of the neck was brown. (*Braz.*)

Alt. 15, greater diam. 25, lesser 20 mill.

Gorendu, Maclay Coast, New Guinea.

H. (*Geotrochus*) *gorenduensis* BRAZIER, Proc. Linn. Soc. N. S. Wales, x, p. 841, 1886.

H. ROLLSIANA Smith. Pl. 1, fig. 12.

Shell imperforate conoid-subglobose, whitish or rubescent, marked with brown at the suture, variously banded with brown zones, and having a streak of orange behind the lip. Whorls 5, a little convex, sculptured with oblique close rough striæ and lines of growth; last whorl rounded on its latter part, obtusely carinated in front of the mouth, always zoned with white, tinted with purple-rose beneath, in

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front shortly and abruptly descending. Aperture oblique, subquadrate; peristome white, thin, broadly expanded and reflexed, the upper margin sinuated, columellar margin dilated, appressed.

Alt. 20, greater diam. 30½, lesser 21½ mill. (*Smith.*)

South Cape, British New Guinea.

H. (*Papuina*) *Rollsiana* E. A. SMITH, Ann. Mag. N. H. 5th. Ser. xix, p. 423, t. 15, f. 3, 1887.

H. COMRIEI Angas. Pl. 17, figs. 37, 38.

Shell imperforate, conically semi-globose, rather solid, rugosely spirally grooved, and obliquely finely striated, opaque, whitish; spire conoidal, obtuse; whorls 4½, rather convex, the last descending, subangulated at the periphery, somewhat flattened at the base, and a little excavated behind the aperture; aperture diagonal, oval-oblong, pale brown within, peristome white, margins converging, united by a thin callus, right margin sinuous, rather expanded and reflexed, columellar margin dilated and appressed. (*Adams & Angas.*)

Alt. 20, greater diam. 27, lesser 21 mill.

Shores of Huon Gulf, Eastern New Guinea.

H. comriei ANGAS, P. Z. S. 1876, p. 489, t. 47, f. 4, 5.—TAPP. CAN., Ann. Mus. Civ. Genov. xix, p. 155, (transl. of desc.)

(11.) GROUP OF H. EDDYSTONENSIS.

Umbilicate; low-trochiform, the base convex; outer lip expanded, basal lip reflexed, expanded at the insertion and partly concealing the umbilicus; *surface sculptured with fine forward-descending wrinkles.* Columella often having a callus fold or obtuse tooth.

H. EDDYSTONENSIS Reeve. Pl. 10, figs. 79, 80.

Umbilicate; low-trochiform, solid, angulated or sub-carinate at the periphery. Surface striatulate and closely sculptured with fine forward-descending wrinkles, becoming concentric on the base. Spire low-conic, apex obtuse; *earlier whorls whitish-corneous*; whorls 5, somewhat convex, the last not descending in front, obtusely keeled at the circumference. Color opaque buff, with a lighter peripheral zone having a brown band above and below it, and often a few other obscure bands both above and beneath.

Aperture oblique, within showing the white and dark bands and somewhat streaked with brown. Peristome white (often tinted

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SECOND SERIES: PULMONATA.

MANUAL

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Nov. 19, 1891.

OF

CONCHOLOGY;

STRUCTURAL AND SYSTEMATIC.

WITH ILLUSTRATIONS OF THE SPECIES.

BY GEORGE W. TRYON, JR.

CONTINUATION BY

H. A. PILSBRY,

CONSERVATOR OF THE CONCHOLOGICAL SECTION OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

VII. 2

Part.....

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where the bands terminate), outer lip broadly expanded, columellar lip broad, dilated, about half closing the umbilicus.

Alt. 17, greater diam. 23, lesser 18½ mill.

Eddystone and Simbo Islands, Solomon Group.

H. eddystonensis REEVE, Conch. Icon. f. 1384; 1854.—DOHRN, in Conchyl. Cab. p. 568, t. 168, f. 5, 6.—*H. motacilla* SMITH, P. Z. S. 1885, p. 591.

Usually has two rather narrow brown bands, bounding a peripheral whitish zone. There is an ill-defined opaque whitish band below the suture. The variations include forms with one or several additional narrow bands above and below, and some specimens are bandless, unicolored straw-yellow.

H. GELATA Cox. Pl. 10, figs. 93, 94.

Shell conoidly depressed, rather narrowly umbilicated, of a dark brown color, profusely ornamented and zoned with opaque white, apex almost black, transversely striated from left to right with very fine strait-striæ, which are decussated above with slightly undulating coarser striæ from right to left, at the base these undulating striæ become longitudinal; whorls 5, convex, suture deep; base convex; aperture rotundately lunar, dark chestnut within; lip white, margins somewhat approximating, joined by a thin callus; upper margin broadly expanded, basal reflected, columellar margin triangularly dilated and reflexed, half concealing the umbilicus. (*Cox.*)

Diam. greatest 0·87, least 0·71, height 0·68 of an inch.

A small island near *Eddystone Id., Solomon Group.*

H. gelata Cox., P. Z. S. 1873, p. 149, t. 16, f. 5a, 5b.—BRAZIER, Proc. Linn. Soc. N. S. Wales. v, p. 446, (with var. *maddockei.*)

Closely allied to and perhaps a variety of *H. eddystonensis*, from which the dark apical whorls and more variegated color separate it. Cox says:

I was at first disposed to look upon it as a variety of *Helix eddystonensis* (Reeve), but the sculpture of this shell appears to me to be always coarser, and the surface invariably more or less covered with a thick white, opaque enamel, unlike the thin epidermis which covers *H. eddystonensis*. Its dark, almost black, apex and white zoned and irregularly ornamented body show in strong contrast, and resemble more some of the Philippine Island species than any of those found in the Solomon Islands. This species is uniformly of a smaller

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size than *H. eddystonensis*, and is more solid and more raised in the spire. (*Cox.*)

Var. MADDOCKSI Brazier. Pl. 16, figs. 11, 12, 13.

The form is like *H. eddystonensis*, from which this variety differs in having the upper whorls red or dark purple. It is straw-yellow, unicolored, or with one or two bands at the obscurely angled periphery. The lip is broadly expanded, white. Sculpture as in *H. eddystonensis*.

Small island near *Eddystone Id.*

Brazier found this form much more abundant than typical *gelata*, which inhabits the same island. He enumerates many varieties of striping (see below). The figures on my plate are drawn from authentic specimens.

Var. *a*. Light-yellow, ornamented with one broad chestnut-band on the periphery and continuous at the suture.

Var. *b*. Darker yellow, ornamented on the base with two fine lines on the periphery, two wider and a fine one below the suture.

Var. *c*. Nearly white, base with one broad band nearly black, periphery and upper part ornamented with three broad bands.

Var. *d*. Light-brown, base ornamented with one narrow chestnut line, periphery with two rather broad, white lines at the suture; below a light-brown intermingled with a few dark-brown opaque spots.

Var. *e*. Bright straw-yellow, two narrow reddish bands on the periphery, apex light-red.

Var. *f*. Light-yellow, nearly white, the periphery ornamented with one narrow reddish line, obsolete on the upper whorls.

Var. *g*. Light-yellow, with opaque white band on the periphery with a fine reddish line above and below it.

Var. *h*. Dark-yellow, ornamented with numerous opaque lines of a light-yellow on the periphery and base, upper whorls white, apex dark-red.

Var. *i*. Light-straw-yellow, upper whorls white, apex dark-red. (*Brazier.*)

H. MOTACILLA Pfeiffer. Pl. 11, figs. 6, 7.

Umbilicate, solid, opaque, low-trochiform, obtusely carinated at the periphery; spire conoidal, apex obtuse; surface striatulate and obliquely corrugated by very fine forward-descending wrinkles. Color a whitish-brown, with an opaque white girdle at the periphery,

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and usually under the suture. Whorls 5, convex, separated by impressed sutures; the earlier two whorls darker, of a reddish color; last whorl a trifle descending in front, angular at the periphery, convex beneath.

Aperture oblique, transversely oval, light and having brown stains within; lip expanded, white, dilated at the columellar insertion. Alt. 16½, greater diam. 22, lesser 18½ mill.

Eddystone Id., Solomon Group.

H. motacilla Pfr., Monogr. iv, p. 259; Novit. Conch., t. 31, f. 12, 13.

Differs from *H. eddystonensis* in lacking brown bands and in having a dark apex. The lip is narrower than in *eddystonensis* or *maddocksi*, and the spire rather more conoidal. All of these species, *eddystonensis, gelata, maddocksi, motacilla* are very closely allied, and should perhaps be considered as varietal forms, rather than fully differentiated species.

H. antrorsa Pfeiffer. *Unfigured.*

Shell umbilicated, subconic, thin, striate and decussated with forward-descending wrinkles; *pellucid, corneous-white;* spire conoid, rather obtuse; suture margined; whorls 5, a little convex, rapidly increasing, the last compressed and acutely carinated, nearly flat above, deflexed from the carina in front, the base narrowly inflated around the umbilicus. Aperture very oblique, lanceolate-lunar; peristome thin, margins slightly converging, the upper lip expanded, subrostrate at the outer angle, basal lip strongly arcuate, reflexed, dilated above the umbilicus.

Alt. 12, greater diam. 23, lesser 19½ mill. (*Pfr.*)

Haman Island, Admiralty Group.

H. (*Cymotropis*) *vitrea* v. Mart. in Die Heliceen 2d. edit., p. 169, not *H. vitrea* Fér., *vide* v. Mart., Ostas. Zool. Landschn., p. 319.—*H. antrorsa* Pfr., P. Z. S. 1855, p. 113; Monogr. iv, p. 254.

H. sachalensis Pfeiffer. *Unfigured.*

Shell narrowly umbilicated, conoid, thin, striate, subdecussated with forward-descending striulæ; tawny-whitish, with a white peripheral band, above it a narrow chestnut band, and some brown ones. Spire conoid; whorls 4½, moderately convex, the last not descending, carinated in the middle. Aperture oblique, rhombic-

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lunar; peristome thin, margins subconniving, the upper arcuate, expanded, basal reflexed, dilated and vaulted at the umbilicus.

Alt. 12, greater diam. 19½, lesser 15½ mill. (*Pfr.*)

Sachala Island, Admiralty Group.

H. sachalensis Pfr., P. Z. S. 1855, p. 114; Monogr. iv, p. 259; *l. c.* v, p. 331.

Var. *b.* Shell a little more elevated, distinctly carinated, having 2 or 3 blackish-chestnut bands.

This unfigured species is perhaps allied to *H. eddystonensis* Rv.

H. leucothoe Pfeiffer. Pl. 12, figs. 22, 23, 24.

Narrowly umbilicated, trochiform, rather thin, striatulate, and having forward-descending striæ above, becoming concentric on the base; whitish; spire turbinate, apex rather obtuse; whorls 4½, convex, the last slightly descending in front, acutely carinated at the periphery, having a single band below the carina; aperture oblique, rhombic-lunar; peristome expanded, upper margin thin, the basal margin thickened in the middle; columellar margin dilated, purplish. Alt. 12½, greater diam. 20½, lesser 17 mill. (*Pfr.*)

New Georgia, Solomon Is.

H. leucothoë Pfr., P. Z. S. 1861, p. 192; Novit. Conch., p. 179, t. 48, f. 7–9; Monogr. v, p. 330.

H. cærulescens Angas. Pl. 10, figs. 91, 92.

Shell subperforate, conoidal, thin, obliquely striated, and the lower whorls decussated by irregular undulating striæ; bluish-gray, with darker bands of the same color, changing into pale yellowish-olive above and at the base, the apical whorls being dark chestnut and with a flesh colored band immediately below the suture, and a similar one at the periphery, with a narrow dark chestnut line in the middle; spire conical, rather obtuse at the apex; whorls 4½, slightly convex, the last descending in front, angled at the periphery, aperture diagonal, sublunar; peristome white, margins converging, the right scarcely flexuous, expanded, the basal one arcuate, reflexed.

Diam. maj. 9, min. 8, alt. 8½ lines. (*Angas.*)

Guadalcanar Is. Solomon group.

H. cærulescens Angas, P. Z. S. 1869, p. 624, t. 48, f. 6.—Pfr., Monogr. vii, p. 381.

Evidently allied to *H. lienardiana.*

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H. PUDICA Pfeiffer. *Unfigured.*

Narrowly umbilicated, trochiform, rather thin, striatulate, having close, forward-descending striæ above, beneath decussated with subconcentric striæ; buffish-fleshy; spire conic, rubescent above, apex rather obtuse; suture light; whorls 5, slightly convex, the last not descending, subacutely carinated in the middle, more convex on the base, having a single chestnut band at the carina; somewhat tumid in front. Aperture very oblique, rounded-subrhombic; peristome subroseous calloused, upper margin a little expanded, basal flexuous, reflexed, dilated above the umbilicus, provided with a nodule within, at the insertion.

Alt. 14–15, greater diam. 22, lesser 19 mill. (*Pfr.*)

New Britian.

H. pudica PFR., Mal. Bl. vii, 1860, p. 236; Monogr. v, p. 330.

An unfigured species, evidently allied to *H. eros, lienardiana,* etc.

H. LEINARDIANA Crosse. Pl. 11, figs. 13, 14, 15, 16, 17, 18, 19.

Half-covered umbilicate, depressed-trochiform, solid but rather thin, about equally convex above and below the acute peripheral keel. Surface striatulate and covered with a close, fine sculpture of forward-descending wrinkles, becoming concentric beneath. Spire low-conic, apex obtuse.

Whorls 4½, rather convex, the earlier red or purple (rarely whitish), the remainder white or buff, with a brown band above, usually wide or split into two or three, and a broad band below the white or buff peripheral zone; the suture is bordered below with white or buff. The upper surface sometimes has a faint bluish band, and scattered purplish dots.

Aperture oblique, vividly banded inside; peristome narrowly expanded, pink at the terminations of the bands and at the root of the columella; basal and columellar lips reflexed, the latter straightened, having a callous fold in the middle, and dilated half over the rather large umbilicus. Alt. 15, greater diam. 21, lesser 17½ mill.

New Georgia, Solomon Is.

H. lienardiana CR., Journ. de Conchyl. 1866, p. 53, t. 1, f. 1.—PFR., Monogr. v, p. 330; Nomencl. Hel. Viv., p. 197.

The expanded columella is pink; the brown bands are generally very vividly contrasted against the opaque white or creamy ground-color, but the upper one is sometimes faint, the surface then usually

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having scattered purplish-translucent dots. It is larger and more solid than *H. eros*, with less expressed keel, more vivid coloring, and wider umbilicus.

H. EROS Angas. Pl. 15, fig. 98, 99, 100, 101.

Narrowly perforated, depressed trochoidal, about equally convex above and below the *acute peripheral keel.* Surface obliquely striatulate, densely sculptured with close, fine forward-descending wrinkles, becoming concentric on the base. Spire low-conoidal, whorls 4½, convex, *the earlier 2 or 3 red*, the remainder opaque, buff, *with scattered grayish-translucent dots*, and a brownish band above and below a whitish peripheral zone. Last whorl convex above and below, generally shortly deflexed in front.

Aperture oblique, subrhombic, more or less streaked and dotted inside on a white ground. Peristome thin, *pink*, expanded, the basal and columellar margins reflexed, the latter straightened, *having an obsolete fold of callus in the middle* and dilated at the insertion, *nearly closing the narrow umbilicus.*

Alt. 14, greater diam. 18, lesser 14½ mill.

Shortland, Stephens and Ysabel Is., Solomon Group.

Geotrochus eros ANGAS, P. Z. S. 1867, p. 888, t. 43, f. 4–6.—*H. eros* PFR., Mon. vii, p. 389.—BRAZIER, Journ. de Conchyl. 1880, p. 313.—SMITH, P. Z. S. 1885, p. 592.

This species resembles *H. fringilla* in the red or pink upper whorls, and the callous fold on the columellar lip; it differs in being perforated, smaller, thinner, and sculptured in a totally different manner. It is, in fact, very closely allied to *H. lienardiana*, but is smaller, with narrower umbilicus and far less vivid coloring. Lives upon trees.

H. REDEMPTA Cox. Pl. 3, figs. 40, 41.

Shell obicularly convex, imperforate, obliquely finely striated from above downwards and backwards with strait striæ, and on the last two whorls from behind forwards with interrupted malleated striæ, of a dull opaque white color, apex pink, variously ornamented with irregular dark chestnut spots, or with two or more regular broad bands; spire bluntly coniform; whorls 5, slightly convex, last sharply keeled and shortly deflected in front, base flattened; aperture quadrilateral, beaked at the periphery of the last whorl, margins joined by a thin pink callus; peristome pink, narrowly reflexed;

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columella broadly dilated, blending with the pink callus joining the margins, and including the umbilicus. (*Cox.*)

Alt. 0·72, greater diam. 1·09, lesser 0·84 inch.

Solomon Is.

H. redempta Cox, P. Z. S. 1873, p. 566, t. 48, f. 6, 6*a*.—Pfr., Monogr. vii.

Differs from *H. eros* in being larger, and imperforate.

H. nigrofasciata Pfeiffer. Pl. 11, figs. 8, 9.

Narrowly umbilicated, globose trochiform, rather solid, obliquely regularly striate, closely decussated with impressed forward-descending lines; buff with two wide black bands, bordered sometimes with brown, spire turbinate, apex rather acute; whorls 4, convex, the last inflated, slightly descending in front, lightly spirally striated beneath; aperture oblique, rounded-lunar, white and black-banded within; peristome white, margins converging, the outer margin expanded and a little reflexed, the columellar widely reflexed, dilated vaultingly over the umbilicus.

Alt. 13, greater diam. 19, lesser 17 mill. (*Dohrn.*)

Admiralty Is. (Pfr.)

H. nigrofasciata Pfr., P. Z. S. 1863, p. 524; Monogr. Hel. Viv. v, p. 337.—Dohrn, Conchyl. Cab., p. 591, t. 173, f. 9, 10.

The locality may not be correct. It has the appearance of a Solomon Island shell.

H. donnaisabellæ Angas. Pl. 5, fig. 87.

Shell perforate, somewhat depressedly conical, moderately solid, very finely malleated by two sets of oblique striæ crossing each other at right angles above the periphery, whilst below it, the malleations become more irregular and flowing; pale yellowish-brown ornamented with a narrow white band below the sutures and one or two dark brown bands on each whorl, the upper one being the narrowest; spire conical, apex rather obtuse; whorls 5½, rather convex, the last not descending, angled at the periphery, a little convex at base, which has a single broader band of dark brown just below the periphery; aperture diagonal, truncately ovate, peristome white, the upper margin narrow, expanded, the lower margin arcuate and reflexed, almost covering the umbilicus.

Diam. maj. 12, min. 10½, alt. 10 lines. (*Angas.*)

Eddystone Is., Solomon Group.

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H. donna-isabellæ ANGAS, P. Z. S. 1869, p. 47, t. 2, f. 7.—PFR., Monogr. vii. p. 380.

(11) GROUP OF H. MOSELEYI.

Imperforate; the spire low, obtuse; whorls few (about 4), rapidly widening, the last descending in front; surface obliquely corrugated; lip well-expanded.

Allied to the group of *H. motacilla*, but imperforate and having fewer whorls.

H. MOSELEYI Smith. Pl. 6, figs. 17, 18.

Imperforate, depressed, the spire low, apex very obtuse; whorls 3½–4, the earlier whorls very wide, the last whorl descending in front, rounded at the periphery. Surface closely, finely sculptured with forward-descending wrinkles, and lightly obliquely striated. Earlier 1½ whorls glossy, corneous, the remainder of the shell opaque whitish, except a corneous, translucent tract around the umbilical region; banded with from one to five translucent-brown bands, or bandless.

Aperture rounded-oval, oblique; peristome white, well expanded all around, the face of the columella flat.

Alt. 14, greater diam. 21, lesser 17½ mill. (Specimen.)
Alt. 11½, greater diam. 18, lesser 15 mill. (Specimen.)
Alt. 15, greater diam. 23, lesser 19 mill. (Smith.)

Wild Island, Admiralty Group.

H. moseleyi E. A. SMITH, Proc. Zool. Soc. Lond. 1884, p. 263, t. 22, f. 2, 2*a*.

The whorls are fewer and wider than in any other *Papuina*. This, in combination with the obliquely corrugated surface, imperforate axis and depressed form, render it easy to recognize.

It has been suggested that *H. moseleyi* belongs to *Cristigibba*, but there is nothing about the shell to warrant such reference.

H. NOVÆGEORGIENSIS Cox.

This species was included in *Planispira* in Vol. VI of the MANUAL, p. 290, although I there expressed the opinion that it might be a *Papuina* (*Geotrochus*). I have now no doubt that it groups here, being the nearest ally known of the preceding species.

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(12) GROUP OF H. FRINGILLA.

Imperforate, globose-trochoidal, solid, the spire rounded; surface striatulate; lip reflexed, columella bearing an obtuse fold, as in the group of *H. lienardiana.*

H. FRINGILLA Pfeiffer. Pl. 16, fig. 8; vol. VI, pl. 49, figs. 20, 21, 22, 23, 24, 25.

Imperforate, solid, depressed-globose, the spire dome-shaped or convexly low-conical; apex obtuse; whorls 4½, slightly convex, the last whorl subcarinated at the periphery, *abruptly deflexed in front, strongly constricted behind the peristome,* which is narrowly reflexed, *white or bright pink;* surface smooth, shining, lightly striatulate. Color olive-yellow, either unicolored or having brown spiral bands; inner whorls white or pink. Aperture oblique, subquadrate, white within; columellar margin straight, sloping, having a more or less distinct fold-like callus, or blunt tooth, on its inner margin, near the insertion.

Alt. 18, greater diam. 24, lesser 21½ mill. (large specimen.)

Alt. 16, greater diam. 21, lesser 19 mill. (average.)

New Georgia, Solomon Group; Admiralty Is.

H. fringilla PFR., P. Z. S. 1855, p. 113; Mon. Hel. Viv. iv, p. 202.—DOHRN, Conchyl. Cab., p. 575, t. 169, f. 13–18.—*Helicostyla fringilla* PFR., Mal. Bl. 1855, p. 145.—*Merope fringilla* ALB., Die Hel. ii, p. 158.—BRAZIER, Journ. de Conchyl. 1880, p. 319.—*Obba fringilla* FRAUENFELD.—*Serpentulus fringilla* TAPPARONE CANEFRI, Viag. Magent., p. 95.

Differs from other species of *Papuina* in the convex outlines of the spire, the constriction behind the lip, and the subdentate columella. It varies much in color-pattern. Some specimens are pure white, the lip either white or rose-color.

H. BARNACLEI Smith. *Unfigured.*

Shell imperforate in the adult state, (narrowly umbilicated when immature and acutely angled at the periphery) conoidly globose, with a very shining surface, of a rich fulvous or deep fawn color, the upper whorls become gradually paler than the last, and toward the apex are semitransparent horn color and encircled by a single narrow dark brown line just above the suture, which is white; this line becomes much broader upon the body whorl, which has a second similar band beneath the more or less white periphery; this is

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obsoletely keeled or angulated near the upper end of the lip, the keel vanishing altogether on the last half of the whorl; whorls 4½, a little convex, having no other sculpture than the arcuate lines of growth (except in young shells, where they are obsoletely spirally striated), the last somewhat ventricose, very shortly deflexed at the aperture; beneath paler or horn color and a little concave in the middle or umbilical region; the aperture is very oblique, very irregularly triangular lunate, white within banded with black and brown (the latter not visible exteriorly); lip not much thickened on the outer and basal margins, narrowly expanded and reflected, whitish, and margined on the outside with a chestnut band; the columellar margin white, almost straight, thicker than elsewhere. (*Smith.*)

Alt. 15, greater diam. 24, lesser 21 mill.

Hawaii, Sandwich Islands.

H. (*Merope ?*) *barnaclei* E. A. Smith, Ann. Mag. N. H. (4th Ser.,) xx, p. 242, 1877.

This very pretty species closely resembles *H. fringilla* of Pfeiffer, which inhabits the Admiralty Islands. Indeed it is so nearly related to it that were I not certain of the correctness of the locality whence it was obtained, I should have hesitated to describe it as new.

It is, however, a thinner, lighter, and smoother shell, the spire is a trifle higher and less obtuse, the whorls a little more convex, more regular, the penultimate proportionally smaller, and the last larger and not showing that decided constriction behind the lip which is so characteristic of Pfeiffer's species. The lip, too, is thinner and without the least trace of a tooth-like projection on the columellar edge. Specimens of *fringilla* in fine condition exhibit distinct spiral striæ on the entire surface; such sculpture is only just traceable in young examples of the present species.

One of these young shells has a particularly beautiful appearance, owing to the broad white band at the periphery, which is margined on both sides by a dark brown stripe contrasting prettily with the ground color, which is bright fulvous or rich faun.

Three specimens, one adult and two immature, have been presented to the British Museum by Mr. H. A. Glanville Barnacle, whose name I feel much pleasure in associating with this species, since to him is owing its discovery.

This form of *Helix*, being so different from any other hitherto found in the Sandwich Islands led me to think that there must be some mistake with regard to the alleged habitat. I therefore, wrote

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to Mr. Barnacle upon the subject, whose reply runs as follows:—"I am perfectly certain that the specimens I have were grown on the Sandwich Islands, and some of them had the snails in them. Whilst stationed at Kailua I used at times to go shooting at some brackish ponds about eight miles away; and whilst going quietly amongst the broad reeds to shoot a duck I saw one of the shells about half way up a reed. I took it and found two or three more that day, and now and then others, but not many. Few Europeans go to these ponds, as it is impossible to find them without a guide over the lava for there is no road. Some I found with the snail, others without; those with the animal I put into a cigar box and filled it up with sea sand; and so the animal died out, and then I washed them."

This circumstantial account removes all doubt respecting the true home of this shell. Notwithstanding its close affinity to *H. fringilla*, the remoteness of the habitats of the two species and the extreme isolation of the Sandwich Islands are sufficient reasons in themselves to determine the specific distinctness of these shells. (*Smith.*)

(13) Group of H. helicinoides.

Imperforate, trochiform species, with rhombic aperture, the lip thickened within, not expanded, or only slightly; *the columellar lip not expanded or reflexed.*

These characters define one of the most distinct groups of *Papuina*, —a group far more deserving of a sectional name than *H. fringilla*, *H. antrorsa* or other of the species representing so-called "sections."

I have examined many specimens of all the species except *H. zelina*, *H. cyrene* and *H. quirosi*.

The species inhabit the Admiralty Is., Solomons and New Hebrides.

In all other groups of *Papuina* the columellar lip is reflexed.

H. labillardierei Smith. Pl. 15, figs. 91, 92, 93.

Imperforate, trochiform, spire conical, the periphery of the last whorl acutely keeled in front, keel more or less obsolete on the latter portion. Surface lusterless, having rather coarse and irregular oblique striæ. Color whitish unicolored, or with a broad suffused brownish band below the middle of the body-whorl, or entirely light pinkish-brown; *the apex black.* Whorls 5; base very convex, deeply impressed in the center.

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Aperture oblique; lip white, very broadly and flatly expanded, thickened within, abruptly narrowing toward the columellar termination. Alt. 11, greater diam. 15 mill.

Wild Island, Admiralty Group.

H. labillardierei E. A. SMITH, P. Z. S. 1884, p. 264, t. 22, f. 3, 3a.

Allied to *H. helicinoides*, but readily distinguished by the broad lip, constantly black apex, and more globose body-whorl, upon which the keel is more or less obsolete on the latter portion. The convexity of the base around the umbilicus, reminds one of *H. helicinoides*.

H. HELICINOIDES Hombron & Jacquinot. Pl. 15, figs. 72, 73, 74.

Imperforate, trochiform, the spire conical, periphery acutely carinated. Surface lightly striatulate, and densely, most minutely spirally striated. Pale horn-colored, somewhat translucent; aperture subrhomboidal; peristome thickened within, slightly expanded, its face flattened; slightly angled at the position of the carina; columellar margin narrow, having an obtuse callous fold above, near the insertion.

There are 5½ whorls, those of the spire nearly rectilinear, the last whorl slightly convex above and below. The base is deeply impressed at the axis, having a little pit at the place of the umbilicus; around the depression it is very convex, rendering the baso-columellar lip strongly arcuate. Alt. 12, greater diam. 15, lesser 14 mill.

Solomon Islands.

H. helicinoides H. & J. (PFR., Zeitschr. f. Mal. 1849, p. 77) Voy. Pol Sud Atlas, t. 7, f. 34–37.—PFR., Conchyl. Cab., p. 294, t. 125, f. 14, 15; Monogr. iii, p. 104.—*H. cleryi* RECLUZ, Journ. de Conchyl. 1851, p. 211, t. 5, f. 10.—PFR., Monogr. iii, p. 179.—E. A. SMITH, P. Z. S. 1885, p. 592, t. 36, f. 6, (with varieties.)

The prominent characters of typical *helicinoides* are the distinctly narrowed, sinuous columella, strongly arcuate baso-columellar lip, and flattened peristome. The typical *helicinoides* is of a uniform light color. Specimens with these characters strongly developed form Mr. Smith's var. *simboana*.

Var. CLERYI Recluz. Pl. 15, figs. 81, 82, 83, 86–87.

Rather thinner than typical *helicinoides*, the lip generally narrower, less expanded, columella less calloused, basal lip less arcuate;

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horny or whitish with a broad brown band above, and a narrower one just below the periphery, which is very acute and white.

Alt. 10, greater diam. 16, lesser 14½ mill.

Choiseul Bay, San Christoval, Shortland and Treasury Is., Solomon Group.

Typically quite distinct from *helicinoides*, but intermediate forms occur. Smith's *var. septentrionalis* belongs here.

The basal band is wanting in one suite before me (pl. 15, figs. 81–83.)

The form described as var. *meridionalis* Smith (pl. 16, fig. 5) is smaller, pale brown above, with a white, thread-like line at the suture and the acutely keeled periphery, paler beneath, especially toward the center, and have the aperture particularly acuminate at the termination of the keel. It is from Santa Anna Island, living on young cocoa-nut palms, growing on low ground bordering the sea.

H. CINERACEA Hombron & Jacquinot. Pl. 15, figs. 88, 89; pl. 16, figs. 6, 7.

Imperforate, globose-trochiform, the spire conical, periphery of the last whorl acutely keeled. Surface striatulate, most minutely and closely spirally striated. Pale brownish horn-colored, somewhat trauslucent, paler on the central part of the base. Aperture rounded-rhomboidal; peristome white, narrow, very little expanded, thickened within, columellar margin straightened, sloping, slightly sinuous.

There are 5, slightly convex whorls; the apex is corneous-brown; the last whorl is convex above, very convex beneath, far more so than *H. helicinoides*. The color is often reddish-brown with a light band at the suture, and the central tract of the base light; the periphery has a white thread also.

Alt. 10, greater diam. 12½, lesser 11 mill.

San Christoval, Ysabel and Stephens Is., Solomons.

H. cineracea HOMBR. & JACQ., Voy. Pol Sud Atl., t. 7, f. 30–33. —PFR., Monogr. Hel. Viv. iv, p. 203.—*H. cinerarea* ROUSS. in text of Voy. Pol Sud p. 28.

This is a decidedly more globose shell than *H. helicinoides*. The base is more convex, and the columella less sinuated above.

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H. ZELINA Cox. Pl. 15, fig. 90.

Shell imperforate, pyramidally-conical, transparent, thin, obliquely and very coarsely striated, straw colored; whorls 7, almost flat, the last having a very sharp produced keel; suture broadly margined above; base flat; aperture trapeziform; outer margin a little reflected; peristome thickened and white, particularly the lower margin, which is a little everted and reflexed, columellar margin, rather contracted and nodose. (*Cox.*)

Alt. ·60, greater diam. ·62, lesser ·55 inch.

Solomon Is.

H. zelina Cox, P. Z. S. 1873, p. 150, t. 16, f. 6.

This species is probably more closely allied to *H. cineracea* H. & J. and *H. subtecta* Pfr. than to any other. It is a much more conical shell than these, and its sculpture decidedly coarser; the flattened-out keel of the periphery is also characteristic of this species. (*Cox.*)

H. CYRENA Crosse. Pl. 15, figs. 79, 80.

Shell with an almost closed perforation, subtrochiform, quite thin, rather pellucid, quite shining, very finely and subobliquely striatulate; opaque milk-white, with a rather broad translucent zone above. Spire subconic, rather acute, the apex rosy-violet; suture impressed; whorls 5, a little convex, the last whorl subobtusely carinated, not descending, somewhat exceeding the spire in length; base convex, subinflated, more shining, whitish; aperture very oblique, widely lunate-rhombic; peristome milk-white, margins subparallel, the columellar margin somewhat thickened, short; basal margin expanded; outer margin a little reflexed, subangulate in the middle.

Alt. 11, greater diam. 17, lesser 13½ mill. (*Crosse.*)

Habitat unknown.

H. cyrene CR., Journ. de Conchyl. 1869, p. 183; 1870, p. 102, t. 2, f. 2.

Allied to *H. eva* but differing in the slight umbilical perforation, obtuse carina, reflected outer border of the peristome, and the coloration. *H. helicinoides* differs in the more acute keel and the different suture and coloration. (*Cr.*)

H. EVA Pfeiffer. Pl. 15, figs. 84, 85, 76, 77, 78; pl. 16, figs. 1, 2, 3, 4.

Imperforate, trochiform, *solid, opaque;* the spire straightly conic, periphery acutely carinated; surface shining, obliquely striatulate,

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sometimes showing excessively fine spiral lines in places on the base. *Opaque*, white or bluish, creamy or pinkish tinted, unicolored or having a brown band above, often showing a few scattered translucent dots. Whorls 5½, slightly convex.

Aperture oblique, subrhombic, the peristome white or brown, somewhat thickened and obtuse but *not expanded*, the superior margin straight, basal margin forming a *regular curve from outer angle to insertion*, a little thickened within and straightened at the columellar slope.

Alt. 9½, greater diam. 15, lesser 13 mill.

Alt. 9½, greater diam. 12½, lesser 11 mill.

New Hebrides (*Island of Vate.*)

H. eva PFR., P. Z. S. 1852, p. 84; Monogr. iii, p. 180; Conchyl. Cab., p. 190, t. 160, f. 22, 23.—REEVE, Conch. Icon., f. 977.—BRAZIER, Journ. de Conchyl. 1880, p. 313.

This species has the contour of *H. helicinoides* except that the lip is not expanded, the columella not contorted, the base flatter, and consequently the basal lip is much less strongly arcuate. It further differs in being more solid and opaque. These same characters separate it from *cleryi*. It is far flatter below and more solid and opaque than *H. cineracea*.

A form with obtuse periphery also occurs. See pl. 16, figs. 1.

H. LAYARDI Hartman. Pl. 15, figs. 94, 95, 96, 97.

Imperforate, solid, opaque, trochiform, the spire straightly conical, periphery acutely carinated, base flattened. The surface is shining, lightly striatulate. Color white, more or less suffused or streaked with pink in places, having very numerous purplish translucent dots and zigzag marks above, fewer below; often banded.

There are 6½ flat whorls, the carina of the last acute, having a delicate line of white at the edge, bordered above and below with dark purplish-brown. When bands are present there is a faint one in the middle of the upper surface, and a broad or narrow one on the base. They are visible within the aperture. The aperture is rhomboidal, very oblique, the lip *not expanded*, blunt, white; columella oblique, straight, often brown.

Alt. 14½, greater diam. 17, lesser 14½ mill.

Alt. 14½, greater diam. 15, lesser 13 mill.

Aura Island, New Hebrides.

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Oxychona layardi HARTMAN, Proc. Acad. Nat. Sci. of Phila. 1889, p. 91, t. v, f. 3.

Allied to *H. eva* in form of the lip, and the solid opaque texture. Differs in the greater elevation of the spire, larger size and coloration. One specimen before me lacks the peripheral dark girdle.

H. QUIROSI COX. *Unfigured.*

Shell imperforate, conoidly depressed, thin, translucent, rather coarsely striated, of a pale brown throughout; spire broadly and flatly conoid, acute at the apex; whorls 5½ to 6, convexly flattened, the last one considerably inflated, and sharply keeled at the periphery; base rounded; aperture sharply lunar, angled at the periphery of the last whorl and at the junction of the lower and columellar margins; lip slightly thickened and expanded; columellar margin straight, thickened, not dilated or reflected.

Diam. greatest 0·80, least 0·64; height 0·40 of an inch. (*Cox.*)

Solomon Islands.

H. (*Geotrochus*) *quirosi* COX, P. Z. S. 1873, p. 147.—PFR., Mon. vii, p. 316.

This species would be like a magnified specimen of *H. cleryi* Récl. were it not wholly unornamented, much more broadly expanded and less conical. (*Cox.*)

H. PYXIS Hinds. Pl. 13, figs. 42, 43.

Small, imperforate, globose-turbinate, the periphery acutely keeled; white, slightly translucent. Last whorl descending in front, swollen and then contracted behind the lip; columella narrower than basal lip, not expanded or reflexed except immediately at the insertion.

The surface is slightly shining, irregularly obliquely striate, and has irregular spiral impressed lines on the base. The spire is conoidal, apex obtuse. Whorls 4½, convex, the last swollen, acutely keeled, slowly descending in front; base swollen, then contracted just behind the lip. Aperture small, very oblique, rounded, not angular at the position of the keel, which becomes evanescent on the latter part of the body-whorl. Peristome white, right margin slightly expanded, basal margin thickened within; columellar margin narrow, not reflexed.

Alt. 6, greater diam. 7, lesser 6¼ mill.

New Ireland.

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H. pyxis HINDS, Voy. Sulphur, Moll. iii, p. 55, t. 19, f. 10.—PFR., Monogr. i, p. 219; iii, p. 180; Zeitschr. f. Mal. 1849, p. 76; Conchyl. Cab., p. 293, t. 125, f. 12, 13.—REEVE, f. 793.

This is a very pretty little shell, the smallest of the *H. helicinoides* group. It further differs from the others in its white color, globose form, convex whorls, and rounded mouth. The characters of the columella, however, show unmistakably that *pyxis* is correctly grouped here.

H. CRUCIBULUM Pfeiffer. *Unfigured.*

Imperforate, trochiform, rather solid, covered with a greenish-tawny epidermis, partly removed; spire regularly conic, rather acute; suture margined; whorls 6½, the upper a little convex, irregularly striate, the last smooth, not descending, provided with an acute, delicate carina; base more convex, shining, impressed in the middle; aperture oblique, ax-shaped; peristome straight, margins distant, the upper acute, labiate with white within behind the edge, basal margin white callously thickened.

Alt. 10, greater diam. 13½, lesser 12½ mill. (*Pfr.*)

Admiralty Islands.

H. crucibulum PFR., Mal. Bl. iii, p. 241; Mon. Hel. Viv. iv, p. 192.

I do not know where to group this unfigured species.

* * *

II. *Species doubtfully referred to Papuina, inhabiting southeastern Asia, Andaman Is., Java and Sumatra.*

The species included here agree with *Papuina* in general form, but differ in texture and usually also in surface-sculpture and coloring. In shell characters they approach a number of quite diverse groups, so that until the anatomy is investigated we will remain ignorant of the true classification of some of them. Subgeneric names have been proposed for several of the species.

Under the circumstances it seems best to group them in this place temporarily. I have indicated, however, under each group my impressions as to its affinities and correct systematic position.

(1) GROUP OF H. PERAKENSIS.

Thin, straightly conical, carinated species, having decided affinities to the section *Satsuma*, a portion of them certainly belonging there.

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Comparisons should also be made with *Trochomorphoides* of Nevill, type *H. acris* Bens., and *Ganesella* Blanf., type *H. capitium* Bens. These groups having been monographed by Tryon in Vol. III of the MANUAL, 1887, no course is open to me but to include the species here.

Bulimus sphæroconus Pfr., and some other species should have been placed in *Satsuma*, and there are also a number of Philippine Island species likewise belonging to that characteristically east Asiatic section.

H. PERAKENSIS Crosse. Pl. 18, figs. 44, 45.

Shell narrowly umbilicated, turrited-conic, trochiform; slightly subobliquely striatulate; rather thin, subtranslucent, whitish, having a narrow chestnut zone immediately above the suture; spire rather elongated, the apex rotund, sutures impressed. Whorls 6, nearly flat, the embryonic earlier 2 smooth, corneous; the last whorl shorter than the spire (last whorl and spire having the ratio of 4 : 7); last whorl acutely carinated at the periphery, the carina brown, the base nearly flat. Aperture subquadrate ovate, white inside, showing by transparence the brown line at the carina. Peristome simple, shortly reflexed, white, margins separated, the columellar margin short, straight, outwardly dilated and covering a third of the umbilicus; basal margin subarcuate; outer lip subangular at the carina, narrowing above toward the insertion.

Alt. 11, greater diam. 10, lesser 9 mill. (*Crse.*)

Perak.

H. (*Getrochus*) *perakensis* CR., Journ. de Conchyl. 1879, p. 199, t. 8, f. 4.

Var. SUBPERAKENSIS Pilsbry. Pl. 18, figs. 46, 47.

Shell umbilicated, turrited-conic, thin. Whorls 7–7½, the earlier convex, forming an obtuse apex; last whorl carinated, convex beneath, slightly descending in front. Surface finely obliquely striatulate. Aperture oblique, outer lip narrowly expanded, columellar lip broadly dilated.

Alt. 11, greater diam. 10½, lesser 9 mill.; oblique alt. of aperture 5¾, width 7 mill.

Tonquin.

Differs from *perakensis* in the blunter carina, more convex base, and greater number of whorls. The specimens being dead I am not

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certain of the coloring, but no trace of a brown band is visible. It is probably a distinct species.

H. PHONICA Mabille. Vol. VI, pl. 15, figs. 74, 75.

Nearly covered perforate, trochiform, thin but solid, corneous, subpellucid, shining, subarcuately and irregularly striated; spire high-pyramidal, the apex rather obtuse, concolored. Whorls 8, a little convex, regularly increasing separated by impressed sutures; last whorl larger, acutely carinated, sloping above, a little deflexed and dilated at the aperture. Aperture transversely ovate, lunate, angled at the outer lower margin; peristome scarcely thickened, acute, a little reflexed; outer margin a little curved, slightly inflexed; basal margin curved, shortly reflexed; columellar margin dilated in a white triangular plate, nearly covering the umbilicus.

Alt. 12, greater diam. 11, lesser 10 mill. (*Mabille.*)

Tonquin.

H. phonica J. MABILLE, Moll. Tonk., diagn., p. 3, May 14, 1887; Bull. Soc. Mal. Fr. iv, p. 94, t. 2, f. 8, 9, 1887.

Evidently allied to *H. perakensis*, but larger, more acutely keeled, and with narrower umbilicus.

H. ROSTRELLA Pfeiffer. Pl. 18, figs. 48, 49, 50.

Shell umbilicate, globose-trochiform, rather thin, irregularly striatulate, silky, tawny-corneous. Spire conoid, apex rather acute; whorls 5½, a little convex, the last slightly descending in front, carinated above the middle, the base more convex. Umbilicus narrow. Aperture oblique, submargaritaceous inside; peristome white or flesh colored the margins converging, right margin expanded, subsinuate above the carina, then shortly beaked, the basal margin a little reflexed and at the insertion subdilated.

Alt. 10, greater diam. 17, lesser 15 mill. (*Pfr.*)

Laos Mts., Cambodia.

H. rostrella PFR., P. Z. S. 1862. p. 270; Monogr. v, p. 331; Novit. Conch. iii, p. 379, t. 88, f. 1–3.

Var. Corneous-white, with a chestnut band at the carina.

Probably a *Satsuma.*

H. SCENOMA Benson. Pl. 18, figs. 53, 54.

Shell with a narrow funnel-shaped umbilicus, subglobose-conoid, obliquely, irregularly striated, decussated by very minute spiral striæ, whitish under a corneous epidermis, sometimes having a red-

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dish-chestnut band at the carina. Spire conoid, apex rather obtuse, suture impressed; whorls 6, a little convex, the last slightly descending in front, at the periphery obtusely compressedly carinated, convex beneath, compressed around the umbilicus; aperture oblique, subquadrate-lunate; peristome a little expanded, the columellar margin a little reflexed.

Alt. 11, greater diam. 16, lesser 14 mill. (*Bens.*)

Moulmein.

H. scenoma BENS., Ann. Mag. N. H. 3d. Ser. xi, May, 1863, p. 319.—PFR., Monogr. v, p. 331, 502.—HANL. & THEOB., Conch. Ind., t. 53, f. 5, and var. f. 3, 4.

Seems to be a *Satsuma*.

H. BANTAMENSIS Smith. Pl. 18, fig. 51.

Shell elevated conic, obtuse at the apex, narrowly perforated, somewhat thin, grayish-white, scarcely shining; whorls 7, slowly increasing, the three upper ones convex, the remainder nearly flat, all over minutely granulate, sculptured with very oblique delicate growth-striæ, at the scarcely oblique sutures margined with a slender carina; last whorl acutely carinated at the periphery, nearly flat beneath, slightly descending in front. Aperture oblique, small, equaling ⅓ the entire length; peristome whitish, upper margin oblique, thin, sinuous, slightly reflexed, the basal margin broadly expanded, half-covering the umbilicus above.

Alt. 12, greater diam. 11, lesser 10 mill. (*Smith.*)

Bantam, Java.

H. (*Geotrochus*) *bantamensis* E. A. SMITH, Ann. de la Soc. Roy. Malac. de Belgique, xxii (4th ser., ii), p. 217, t. 9, f. 11, 1887.

Remarkable for its elevated form, granulated surface, and the acute peripheral carina, which continuing upward gives the suture a carinated appearance.

H. RUFOFILOSA Bock. Pl. 3, fig. 55.

Shell shortly conical, narrowly umbilicated, thin, semitransparent, of a greyish or horn-color, sometimes with a thread-like red line bordering the sutures and encircling the last whorl at the periphery. Spire with rectilinear outlines, converging at an angle of about 30°, rather obtuse at the apex. Whorls 7, very obliquely striated, slowly increasing, keeled beneath immediately above the suture; three or four uppermost rather more convex than those beneath, which are

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but slightly so; last volution acutely carinate at the middle, and convexly flattened beneath. Aperture small, oblique. Peristome thin, outer margin above the keel scarcely expanded, beneath it feebly thickened and narrowly reflexed, in the umbilical region more expanded and partly concealing the perforation.

Length from 10 to 11 mill., greatest diameter of base also 10–11 mill. (*Bock.*)

Paio, Sumatra; in the forests, 1500 feet above the sea.

H. (*Geotrochus*) *rufo-filosa* Bock, P. Z. S. 1881, p. 630, t. 55, f. 4.

H. niahensis Godwin-Austin. Pl. 18, fig. 66.

Shell dextral, pyramidal, thin texture, base flat; sculpture, spiral liræ, fine, regular, not of continuous thickness, crossed by lines of growth; color white, with some fine marbling in a greyer color, within the aperture porcellaneous white; spire high, pyramidal, sides slightly concave; apex acuminate; suture fine, linear; whorls 7, very flat; aperture ovate, wide and ample, oblique; peristome sharp, coming to an angulate form at the outer keeled margin, expanded and thickened below towards the columellar side.

Size: maj. diam. 18·8, min. 16·0; alt. axis 12·3 mill. (*G. Aust.*)

Niah Hills.

H. (*Geotrochus*) *niahensis* Aust., P. Z. S. 1891, p. 44, t. 2, f. 3.

Described from a single specimen.

H. tigæensis Godwin-Austin. Pl. 18, fig. 65.

Shell pyramidal, rounded below, narrowly umbilicated; sculpture, irregular transverse lines of growth, indistinct concentric striation on base; color very pale ochre throughout; spire pyramidal, sides flat; apex blunt; suture linear; whorls 6, very flat; aperture semilunate; peristome reflected upon the columellar margin, which is very oblique.

Size: maj. diam. 9–3; alt. axis 8·0 mill. (*G. Aust.*)

Tiga Island, Borneo.

H. (*Geotrochus*) *tigæensis* Aust., P. Z. S. 1891, p. 44, t. 2, f. 5.

Described from a single specimen.

H. subflava Godwin-Austin. Pl. 18, fig. 52.

Shell pyramidal, keeled, rather flat on the base, narrowly perforate; sculpture, rough pappillate dottings arranged transversely; color ochre; spire high, sides flat; apex very blunt; suture linear;

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whorls 6, sides flatly convex; aperture quadrate; peristome very thin; columellar margin much reflected, perpendicular.

Size: maj. diam. 7·0; alt. axis 6·5 mill. (*G. Aust.*)

Borneo.

H. (*Geotrochus*) *subflava* AUST., P. Z. S. 1891, p. 45, t. 2, f. 4.

Has the appearance of *Trochomorphoides*.

(2) GROUP OF H. WRAYI. (*Philidora.*)

Philidora DE MORGAN, Bull. de la Soc. Zoologique de France, 1885, p. 384. First species, *P. wrayi.*

The name *Philidora* was proposed by de Morgan as a generic term to replace the preoccupied name *Philina* of Albers. If it were really the same as *Philina*, the name would become a synonym of *Obbina* Semper; but it is not the same. In the absence of specimens I am unable to say whether the group belongs in the neighborhood of the Chinese Fruticicoloid Helices, such as *Satsuma*, or near the section *Trachia*. De Morgan has given no diagnosis or characters of his group.

H. WRAYI de Morgan. Pl. 18, figs. 55, 56, 57, 58.

Shell dextral, flattened, bluish-white, narrowly umbilicated, striate, strongly carinated, composed of 5 whorls, ornamented with ribs parallel to growth-lines; upper surface of the whorls flattened, lower surface rounded; suture linear, very distinct. Aperture oblique, elliptical irregular, encroached upon by the preceding whorl; peristome reflexed.

Alt. 6, diam. 15, length of aperture 8 mill. (*Morgan.*)

Lahat, Ipoh, Valley of the Kinta River, Perak.

Philidora Wrayi MORGAN, Bull. Soc. Zool. Fr. 1885, p. 384, t. 6, f. 5.

H. HARDOUINI de Morgan. Pl. 18, figs. 60, 61, 62, 63.

Shell dextral, flattened, translucid, corneous, widely umbilicated, permitting the whorls of the spire to be seen within it; finely striated and very strongly carinated, carina extending to the aperture; composed of 5–6 whorls, which are flattened above, rounded beneath; suture a little distinct. Aperture oblique, elliptical, irregular, slightly encroached upon by the preceding whorl; peristome reflexed.

Alt. 8, diam. 17 mill. This shell is of a corneous brown color, the aperture lighter. (*de Morgan.*)

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Between Lahat and Ipoh, valley of the Kinta river, abundant in moist places in the forest.

Philidora Hardouini DE MORG., Bull. Soc. Zool. Fr. 1885, p. 385, t. 5, f. 10.

(3) GROUP OF H. ARFAKIENSIS. (*Coliolus.*)

Coliolus TAPPARONE CANEFRI, Ann. Mus. Civ. Genov., 2d. ser., iv, p. 131, 1887.

Shell elevated-conical, many-whorled; whorls obliquely costulate and bristly; apex obtuse, mamillar; base depressed; terminations of the peristome connected by a callus. (*T. C.*)

This section, founded upon a most singular shell, is placed by Tapparone Canefri in the vicinity of the section *Trochomorphoides* of Nevill.

H. ARFAKIENSIS Tapparone Canefri. Pl. 18, fig. 59.

Shell trochiform, narrowly umbilicated, corneous; spire much elevated, somewhat constricted above, the apex mamillar. Whorls 11, the earlier 4 convex, spirally striate, the following whorls plano-convex, obliquely sharply costulate, setigerous at middle and base, the bristles long, nearly covering the suture; last whorl acutely carinated at the periphery, the base nearly flat, radiately, finely striated. Aperture dilated, rhombic-quadrangular, very oblique, the peristome sinuous above, subexpanded, reflexed beneath, incurved and in the middle subangulated, the margins distant, joined by a thick callus.

Alt. 11½, greater diam. 8¾, lesser 7½ mill. (*T. C.*)

Hatam, Mt. Arfak, New Guinea.

H. arfakiensis T. C., *l. c.*, p. 131, t. 1, f. 21.

(4) GROUP OF H. TROCHALIA.

Umbilicate; depressed, strongly carinated; the last whorl deflexed in front; aperture elliptical, peristome reflexed; surface simply striate.

The following species has been placed in *Geotrochus* by Pfeiffer, in *Ampelita* by Tryon, and in *Planispira* by Nevill. It seems to me to be closely allied to *H. gabata* Gld., *merguiensis* Phil., etc., species belonging very close to *Trachia*, and probably to be included therein rather than in *Plectotropis*.

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H. TROCHALIA Benson. Pl. 18, figs. 67, 58.

Shell umbilicate, depressed, acutely carinated at the periphery, low conical above, convex below; chestnut brown, becoming lighter toward the apex; lightly, obliquely striated. Whorls 5, the last descending to the oblique, transversely oval aperture; lip expanded, reflexed, pinkish-white, its ends approaching, the columellar termination half-concealing the umbilicus.

The convexity is about equal above and below the pinched-out keel; the earlier whorls are convex, the latter two flattened, the last whorl being excavated just above and below the keel, and rather abruptly deflexed in front.

Alt. 14, greater diam. 23, lesser 19 mill.; width of umbilicus 2 mill.; oblique alt. of aperture 11, width 15 mill., measurements including peristome.

Port Blair, Andaman Is.

H. trochalia BENS., Ann. Mag. N. H. 3d. Ser., vii, p. 82, Feb., 1861.—PFR., Monogr. v, p. 329.—HANL. & THEOB., Conch. Indica, t. 38, f. 7.—STOLICZKA, Proc. Asiat. Soc. Beng., March, 1870, p. 87. —TRYON, Amer. Journ. Conch. vi, p. 287.—*Ampelita* (*Helix*) *Bigsbyi* TRYON, Amer. Journ. Conch. v, p. 110, t. 10, f. 3.

A peculiar shell, of doubtful affinities, but apparently more nearly related to the Indo-malayan species with which I above associate it, than to *Obbá* or *Obbina*.

Unfigured, undetermined species.

H. TRITONIENSIS Le Guillou. Shell trochoidal, sub-umbilicate, whitish-tawny, substriate; whorls 5–6, a little convex, the last rounded, convex beneath; spire conic-depressed; aperture narrow; lip sub-reflexed; umbilicus small, punctiform.

Alt. 7½, diam. 9 mill. (*Guill.* in Revue Zool. 1842, p. 138.)

Triton Bay, New Guinea.

H. HYALINA Le Guillou. Shell trochoidal, carinated, scarcely umbilicated, hyaline, subvitreus. Whorls 6, subconvex, the base depressed; delicately striated, the last having an acute carina a little reflexed upward, convex-depressed beneath; aperture sublanceolate, acute, anteriorly, base rounded, subreflexed, obliquely straightened toward the umbilicus. Alt. 10, diam. 15 mill. (*Guill.*)

Solomon Islands.

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H. hyalina LE GUILL., Revue Zoologique 1842, p. 139.—*H. reflexiuscula* PFR., Symbolæ ii, p. 98, Monogr. i, p. 327.

Pfeiffer suggests the name *reflexiuscula* because *hyalina* was supposed to be preoccupied. The species has not been recognized by anyone since Le Guillou.

H. TESTUDO Pfeiffer. Pl. 18, fig. 64.

Imperforate, trochiform, rather solid, striate and decussated by oblique wrinkles; pale isabelline, painted with spots and flames of brown; spire conoid, rather acute; suture carino-marginate. Whorls 5, a little convex, regularly increasing, the last acutely carinated, tumid above, slightly deflexed in front; base subplanate. Aperture very oblique, rhombic-lunar; peristome whitish, upper margin expanded, basal reflexed, columellar margin wide, flat, adnate. Alt. 17, greater diam. 35, lesser 28 mill. (*Pfr.*)

Madagascar.

H. testudo PFR., P. Z. S. 1858, p. 21, t. 40, f. 6; Mal. Bl. 1859, p. 14; Monogr. v, p. 271.

If this is really from Madagascar I would refer it to *Ampelita*. The original figure is copied on my plate.

Section ALBERSIA H. Adams, 1865.

Albersia H. AD., P. Z. S. 1865, p. 410. Type *H. granulata* Q. & G.—PFR., Nomencl. Hel. Viv., p. 198, 1878.—v. MARTENS, Ostas. Zool. Landschn., p. 329, 1867.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 185, 1883.

Shell globose; aperture but little oblique, the peristome scarcely thickened, narrowly reflexed; columellar margin steeply ascending, narrowed below. Unicolored, never brilliantly colored, often hirsute.

This group should probably be regarded as a section of the genus or subgenus *Chloritis*. This view of its position is that taken by H. Adams and Tapparone Canefri. Von Martens, however, expresses the opinion that its affinities are with the Philippine Island group *Cochlostyla* (*s. lat.*); and he is followed by Pfeiffer, who places *Albersia* at the end of the Helices between *Acavus* and *Axina*.

Albersia is herein accepted in the restricted sense as it is understood by Pfeiffer. *H. najas*, *H. extensa* and *H. obliquata* have also been included by some authors, but they are not separable conchologically from the section *Corasia* of Cochlostyla.

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The jaw of *H. pubicepa* is arcuate and ribbed.

H. GRANULATA Quoy & Gaimard. Pl. 19, figs. 1, 2.

Shell covered perforate, globose, delicately granulate, golden or rufous encircled with a brown band. Spire short; whorls 5½, nearly plane, the last large, inflated. Aperture ample, lunate-elliptical; peristome little reflexed, white, the columellar margin emarginate, broadly dilated, wholly closing the perforation.

Alt. 33, greater diam. 50, lesser 41 mill. (*Pfr.*)

Port Dorey, New Guinea; Is. of Waigheu.

H. granulata Q. & G., Voy. Astrol. Zool. ii, p. 95, t. 7, f. 6–9.—FER. & DESH., Hist., p. 249, t. 28A, f. 9–10.—RVE, Conch. Icon., t. 69, f. 358.—PFR., Conchyl. Cab., t. 137, f. 13, 14; Monogr. i, p. 233; iii, p. 181.—*H.* (*Pomatia*) *granulata* PFR., Versuch. etc., p. 133.—*Albersia granulata* WALLACE, P. Z. S. 1865, p. 410.—*H.* (*Albersia*) *granulata* PFR., Nomencl. Hel. Viv., p. 198.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 185.

Variety. Shell dark blackish-brown, the band slightly darker; surface shortly hirsute; spire a little higher; peristome lilac, broadly expanded and revolute.

Alt. 33, greater diam. 50, lesser 39. (*Pfr.*)

H. PUBICEPA Martens. Pl. 19, figs. 9, 10, 11.

Shell subglobose, thin, striatulate, downy, the hairs standing in quincunx; fleshy-brown, with a reddish peripheral band, pale, bordered above and below. Spire convex; whorls 5, the last inflated, a little descending in front. Aperture moderately oblique, lunate-rounded; peristome shortly reflexed, thin, rufescent, margins remote from one another; columella obliquely descending, thickened, flesh-color. (*Mts.*)

Alt. 24, greater diam. 36, lesser 28 mill.

Alt. 20½, greater diam. 29, lesser 24 mill.

Halmaheira and Batjan, Moluccas. In gardens and the forest, not common.

Cochlostyla pubicepa MARTENS, Monatsb. Berl. Akad. 1864, p. 269.—*H.* (*Albersia*) *pubicepa* MTS., Preuss. Exped. nach Ostas., Landschn., p. 329, t. 18, f. 2.—PFR., Monogr. v, p. 281.—*Helix tortistylis* MOUSS., in coll.

Intermediate between the coarsely granulose *H. granulata* and the smooth *H. zonulata*. It is allied to, or at least similar to *H.*

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tenuis Pfr., the habitat of which is unknown; but it is flatter, the whorls more rapidly increasing, the peristome straight, and the columella differently formed.

The jaw is arcuate, ribbed.

H. ZONULATA Ferussac. Pl. 19, figs. 7, 8 (and var. f. 6.)

Shell imperforate, depressed-globose, thin; roughened by very minute decussating lines, a little shining; of a tawny flesh color with a whitish band at the periphery, and a narrow rufous band above it. Whorls 5, a little convex, the last ventricose; columella slender, reddish, calloused. Aperture rotund-lunar; peristome simple, reflexed, columellar margin dilated, covering the place of the umbilicus, its junction with the basal margin forming a subdenticulate angle.

Alt. 15, greater diam. 26, lesser 21 mill. (*Pfr.*)

New Guinea at Port Dorey; Andai; Amberbaki; Waigheu; Wokan, Wama and Giabu Lengen, Aru Is.; Is. of Jobi, in the bay of Geelvink; Secaar, S.-E. New Guinea.

H. listeri FER., Prodr., p. 28, no. 22, (not *H. listeri* Gray).—*H. zonulata* FER., Prodr., p. 67; Histoire, t. 15, f. 1, 2.—PFR., Conch. Cab., p. 310, t. 53, f. 3–5; Monogr. i, p. 261.—MARTENS, Ostas. Zool., p. 393.—*Albersia zonulata* WALLACE, P. Z. S. 1865, p. 410.—*H.* (*Albersia*) *zonulata* TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 185; and *l. c.* 2d. ser., iv, p. 143, 1887.—*H. lemniscata* LESSON, Voy. de la Coquille, p. 306.—*H. recluziana* LE GUILL. Rev. Zool. 1842, p. 137.—PER., Monogr. i, 334.

Var. RECLUZIANA Le Guill. Pl. 19, fig. 6.

Shell larger. Alt. 17, greater diam. 30, lesser 24 mill.

VAR. Shell smaller, rather solid, peristome without a tooth.

Alt. 12, greater diam. 19, lesser 16 mill. (*Tap. Can.*)

Andai; Amberbaki.

H. TENUIS Pfeiffer. Vol. V, pl. 6, figs. 56, 57.

Shell imperforate, subglobose, thin, brown with a rufous zone, marked with obsolete impressed concentric lines, covered with a very thin silky epidermis; spire rather obtuse; whorls 5, rapidly increasing, slightly convex, the last large, inflated, excavated at the oblique, subtortuous columella. Aperture lunate-oval; peristome straight, simple, subthickened at the base.

Alt. 20, greater diam. 32, lesser 26 mill. (*Pfr.*)

Habitat unknown.

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H. tenuis PFR., P. Z. S. 1845, p. 41; Monogr. i, p. 24; Conchyl. Cab., t. 157, f. 5, 6.—REEVE, Conch. Icon., f. 759.—*H.* (*Eurycratera*) *tenuis* PFR., Nomencl. Hel. Viv., p. 169, 1878.

A species known only by Pfeiffer's and Reeve's descriptions and figures.

Genus COCHLOSTYLA Férussac, 1819.

Cochlostyla FERUSSAC, Tab. Syst. des Anim. Moll. Prodr. gén., p. 47, 1819.—PFR., Symbolæ i, p. 21.—v. MARTENS, in Albers, Die Heliceen 2d. edit., p. 173; Preuss. Exped. Landmoll., p. 96.—SEMPER, Reis. Archip. Phil., p. 164.

COCHLOSTYLA includes *Chloræa, Corasia, Axina, Pfeifferia, Calocochlia, Helicostyla, Orustia, Cochlodryas, Orthostylus, Helicobulimus, Ptychostylus, Phengus, Eudoxus, Hypselostyla, Canistrum, Prochilus, Chrysallis, Phœnicobius.*

Shell varying from depressed, Helicoid, to elongated and Bulimiform, usually imperforate; rounded at the circumference or keeled; the lip generally reflexed (rarely simple and acute); usually covered with a thin, transparent cuticle, often porous in places, when it becomes white and opaque, producing the "hydrophanous" patterns with which most of the species are ornamented.

The species are with few exceptions confined to the Philippine Archipelago. They are mainly arboreal in habit.

The species, however diverse in form of the shell, agree in anatomy. There are no accessory appendages to the male genital system; the female system has a single mucus gland, globular or oval in shape, which combines with the sac of the simple stylet-formed dart. The duct of the receptaculum seminis is long. The jaw has strong ribs.

Diverse as the shells assembled in this genus at first appear, it is without doubt a perfectly natural group. The extreme forms are so closely connected by intermediate species that no satisfactory groups of subgeneric rank can be defined.

The system of sections or groups briefly sketched by v. Martens (Ostas. Zool., p. 96), and improved by Semper (Phil. Archip. Landmoll.) is in my opinion the most natural yet proposed. I have, therefore, in the following pages followed the same general arrangement and sequence of groups; but not without modifying them materially as to contents and limits, and adding several groups to the already large number. In the system herein set forth, the species

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are divided into twenty sections, the series beginning with the depressed, and ending with the elongated species. A table exhibiting the characters of the sections will conclude the account of the species.

The principal special authorities consulted on the Philippine Island fauna are:

Dr. C. Semper, Reisen im Archipel der Philippinen, vol. iii, Landmollusken.

We are indebted to Semper for a vast amount of information on the distribution as well as the anatomy of Philippine land snails.

Dr. O. F. von Möllendorff, Die Landschnecken Fauna der Insul Cebu, in Bericht über die Senckenbergische naturforschende Gesellschaft zu Frankfurt a. M., 1890. Also numerous papers published in Nachrichtsblatt der Deutschen Malakozoologischen Gesellschaft.

A most excellent paper on the shells of the island Zebu.

J. G. Hidalgo, Obras Malacológicas, parte I, Estudios preliminares sobre la Fauna Malacológica de las Islas Filipinas, in Memorias de la Real Academia de Ciencias Exactas, Fisicas y naturales de Madrid, xiv. Also papers by the same author in the Journal de Conchyliologie.

Of Sr. Hidalgo's *Estudios*, etc., only 160 pages, 30 plates, have as yet (Sept., 1891) been published, containing of the genus *Cochlostyla* only *Corasia*, *Axina* and part of *Chlorœa*. This magnificent work will when completed, leave little to be desired as far as the illustration of the shells is concerned. The text is of equal merit, being characterized by a broad conservatism, and excellent judgment in the treatment of species.

Section I. Chlorœa Albers, 1850.

Chlorœa Alb., Die Hel., p. 113.—v. Mart. in Albers, 2d. edit., p. 169, (type *H. sirena* Beck).—Semper, Reis. Archip. Phil., Landmoll., p. 226, (in part.)

Imperforate, varying from depressed-globose to lens-shaped, generally solid; whorls 4–5, the last descending or not; lip decidedly reflexed, at least below. *Entire surface* showing under a lens *excessively fine, close spiral lines; lacking hydrophanous patches on the cuticle.*

Anatomy as in *Cochlostyla* generally, except that the simple mucus gland is aciniform, not globular. *C. sirena* has a short flagellum on the penis.

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Heliciform shells, distinguished at once from the closely allied section *Corasia* by the excessively close, fine spiral striation covering the whole surface both above and below, except the smooth apical embryonic whorl. These snails live on trees, like *Corasia* and most other Cochlostylas.

The present group is equivalent to Semper's "*Gruppe der buntschaligen Chloræen.*" His "*Gruppe der einfarbigen Chloræen*" consists of species of *Dorcasia*. They differ from the true *Chloræa* species in having a compound mucus gland ("multifid gland"), composed of several acinose cæca, whilst that gland in *Chloræa*, as in all *Cochlostyla*, is simple; the shells also are notably different.

The species of *Chloræa* fall into four groups, as follows:

A. Latter half of the body-whorl in no part narrower than the adjacent part of the preceding whorl, viewed from above.

1. *Solid, keeled or rounded, usually banded.* Group of C. fibula.
2. *Thin, acutely keeled; greenish, often banded.* Group of C. dryope.

B. Latter half of the body-whorl narrower in some part than the preceding whorl, viewed from above.

3. *Last whorl not acutely keeled, descending in front.* Group of C. paradoxa.
2. *Last whorl acutely keeled, not descending in front.* Group of C. thersites.

(1) Group of C. fibula.

Solid, varying from depressed-globose to lens-shaped, carinated or rounded at the periphery, the last whorl circular in circumference, not laterally flattened on its latter half; descending in front; lip thickened and reflexed; usually banded.

These shells are more solid than in the closely allied group of *C. dryope;* they do not have the last whorl compressed at the periphery as in the group of *C. paradoxa.*

C. fibula Broderip. Pl. 22, figs. 21, 22, 23; pl. 21, figs. 31, 32, 33.

Imperforate, depressed, solid, the entire circumference acutely carinated; white or pale yellowish, generally three-banded; a broad purplish-brown band below and another above the periphery, the latter ascending the spire in company with a narrow dark line bordering the lower edge of the suture.

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The shell is about equally convex above and below; whorls 4–4¼, the last abruptly descending in front, and a little constricted behind the lip. Surface very finely, spirally striated. Aperture very oblique; peristome white, narrowly expanded above, reflexed below; columellar margin adnate. Alt. 11, diam. 20 mill.

Luzon; Lubang; Marinduque; Zebu.

Carocolla fibula BROD., mss.—REEVE, Conch. Syst. ii, t. 167, f. 5. —*Helix fibula* PHIL., Abbild. i, p. 12, t. 1, f. 8.—PFR., in Conchyl. Cab., t. 69, f. 5–7; Monogr. i, p. 300.—REEVE, Conch. Icon., f. 137. —HIDALGO, Obras Malacol. i, p. 156, t. 25, f. 4, 5 (type), 6–8 (vars.)

This is a larger species then *C. hanleyi*, and the whorl is less deflexed in front. Some forms of *C. hugeli* approach it, but they are less acutely keeled behind the lip, and differ in coloring. Hidalgo describes the following color-varieties:

1. Whitish or whitish-yellow, unifasciate above and below.
2. No band beneath.
3. Smaller; white, not banded. From *Marinduque* (pl. 21, fig. 33.)
4. Chestnut colored above, with a white peripheral band continuing up the spire above the suture; base 4-zoned, the two columellar zones tawny, outer paler, the third zone chestnut, the peripheral zone white (pl. 21, figs. 31, 32.)
5. Buff, not banded below. *Island of Lubang.*

C. HANLEYI Pfeiffer. Pl. 22, figs. 24, 25, 26, 27, 28.

Imperforate, depressed, solid, *acutely carinated;* light *greenish-yellow, a band at the carina and a border below the suture opaque white.* Last whorl *very deeply deflexed* in front, the aperture nearly horizontal.

The shell is about equally convex above and below; surface microscopically striate spirally. Whorls 4, flat, the entire circumference of the last whorl acutely carinated. Aperture small, oval, subhorizontal; the peristome white, reflexed, its terminations approaching. Alt. 9, diam. 17 mill.

Sinait, Centro del Abra, Monte Vigan, Ilocos Sur; Bayabas province of Angat, and Santander, province of Morong, in the island of Luzon, Philippines.

H. hanleyi PFR., P. Z. S. 1845, p. 65; Conchyl. Cab., p. 31, t. 69, f. 15, 16 (and 17, 18, var.).—HIDALGO, Obras i, p. 158.—*H. hügeli* RVE., (part.) f. 136e, (and 136d, var.)

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In the typical *C. hanleyi* (pl. 22, figs. 24–26) the whorl is very deeply deflexed in front, the suture and carina are bordered below with white. There are no other bands on the pale greenish-yellow ground-color.

Color var. (pl. 22, figs, 27, 28). Blackish-purple above, banded with white at suture and carina; base buff-white, having a rufous band below the carina. Form as in the type.

Var. HUGELI Pfr. Pl. 22, figs. 15, 18, 19, 20.

Slightly larger than typical *hanleyi*, less acutely carinated, the aperture less oblique and larger. Color greenish-buff with a white girdle at periphery, bordered above and below by narrow green bands. Alt. 12, diam. 18 mill.

Carocolla bifasciata LEA, Trans. Amer. Philos. Soc. (n. ser.) vii, 1841, p. 465, t. 12, f. 18, (not *Helix* (*Oxychona*) *bifasciata* BURROW). —*H. hügeli* PFR., Symbolæ iii, p. 31; Monogr. i, p. 300; Conchyl. Cab., p. 31, t. 69, f. 8–14.—FER., Hist., t. 95, f. 3 (central fig.).—REEVE, Icon., f. 136c.—*C.* (*Chloræa*) *hanleyi var. C.* HIDALGO, Obras Malacol. i, p. 158, t. 25, f. 10.

The name proposed for this species by Lea in 1841, is not preoccupied in *Cochlostyla*, and it should probably be adopted.

A variation of this form (pl. 22, fig. 15) has three narrow brown bands; one below, another above the periphery, and the third closely bordering the suture below. The basal band is sometimes lacking in this color-variety. Pfeiffer's figs. 11, 12, of pl. 69, Conchyl. Cab., represent this form.

Hidalgo believes that Pfeiffer confused two forms under the name *Hügeli;* and considers the figures 10 and 14 to represent the true *hügeli*, of which he considers Semper's *C. antonii* a synonym. In this view I am unable to concur. Pfeiffer's fig. 10 is reproduced on my pl. 22, fig. 20.

C. BENGUETENSIS Semper. Pl. 21, figs. 23, 24, 25.

Imperforate, lenticular, thin, acutely carinated, obliquely striatulate, whitish ornamented with a buff band above the carina and a chestnut line at the suture; spire little elevated; whorls 4, rather flattened, the last deflexed and constricted in front. Aperture large, subhorizontal, angular-elliptical; peristome simple, margins remote, the upper margin slightly expanded, basal margin reflexed.

Alt. 11, greater diam. 23, lesser 18 mill. (*Semper.*)

Valley of Benguet, Luzon, Philippines.

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Chloræa benguetensis SEMPER, Reis. Archip. Phil., Landmoll., p. 227, t. viii, f. 11, 12 (shell and animal); t. xiv, f. 5–8 (anatomy).— HIDALGO, Obras Malacol. i, p. 158, t. 25, f. 1–3.

The color-mutations recorded by Hidalgo are as follows:

1. (Typical). Whitish, with a chestnut sutural line and a buff band above the periphery (figs. 23, 24.)

2. Unicolored, white.

3. Pale straw-colored, with a narrow white peripheral band, narrowly bordered above and below with green, (fig. 25.)

"The second and third varieties have much similarity to *C. hanleyi* and its variety *bifasciata* Lea, but they have the aperture more produced transversely, the peristome narrower, and the last whorl more inflated, around the basal margin of the peristome, as it is in typical *benguetensis*, of which I, therefore, consider them varieties." (*Hidalgo.*)

C. GEOTROCHUS Möllendorff.

Imperforate, trochiform, delicately obliquely striatulate and decussated with close spiral lines; chestnut-brown with a whitish band at the carina and another below the narrow brown subsutural zone; spire subregularly conical, apex obtuse, whitish. Whorl 4½, nearly flat, the last acutely white-carinated, shortly deflexed in front, swollen toward the aperture beneath, having a pale yellowish band around the columella. Aperture very oblique, angulate-elliptical; peristome expanded, albolabiate; columella excavated, oblique.

Alt. 12, greater diam. 21½, lesser 18 mill. (*Möll.*)

Mt. Limutan, Province of Morong, Luzon.

Chloræa geotrochus v. MOLL., Nachrichtsbl. D. M. Ges. 1888, p. 89.

This species has much the aspect of *Papuina cleryi*. It is closely allied to *C. hanleyi* and *C. benguetensis*.

C. ANTONII Semper. Pl. 21, figs. 34, 35.

Imperforate, globose, shining, spirally very minutely striated, pale green or straw colored, having two reddish lines above, sometimes ornamented with a brown band below; spire elevated; suture smooth; whorls 4½, convex, the last deflexed in front; columella short; aperture lunate-rounded; peristome simple, subexpanded, margins conniving.

Alt. 13, greater diam. 18, lesser 15 mill. (*Semp.*)

Northwestern Luzon.

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Chloræa antonii SEMPER, Reis. Phil., Landmoll. iii, p. 228, t. 10, f. 10a, b.—*H.* (*Chloræa*) *hügeli* HIDALGO, Obras Malacol. i, p. 160.

This species I have not seen. It appears to be more globose, with narrower lip and less oblique aperture than *C. hügeli* Pfr.

C. AMŒNA Pfeiffer. Pl. 21, figs. 21, 22.

Imperforate, depressed-globose, solid; *white, having a broad purple-black zone above the periphery* and ascending the spire. *Apex and lip white;* last whorl abruptly and deeply deflexed in front; *not carinated,* often obscurely angled just above the upper insertion of the lip.

Spire convex, apex obtuse; whorls 4½, the last abruptly descending in front, slightly constricted behind the lip. Surface lightly obliquely striatulate and microscopically, spirally striated. Aperture very oblique, oval-truncate, showing the band within; peristome narrowly thickened and reflexed, the baso-columellar margin adnate, straightened, thickened within. Alt. 12, greater diam. 16 mill.

Luzon, Philippines.

H. amœna PFR., P. Z. S. 1845, p. 65; Conchyl. Cab., t. 69, f. 19, 20; Monogr. i, p. 270.—*H. hügeli var.* REEVE, Conch. Icon., f. 136a.

A solid, subglobose species, allied to *C. hügeli,* but not distinctly carinated and differently colored. It is much smaller than *C. paradoxa, restricta* or *undina.*

C. SIRENA Beck. Pl. 21, figs. 15–20.

Imperforate, globose-depressed, thin but solid, the periphery rounded except just in front of the aperture where it is carinated; sometimes uniform straw-yellow with white apex, but usually pale cream-white or pale green with the apical whorl pink, the body-whorl encircled with one or two green or greenish-purple zones, visible as vivid brown bands within the aperture, the upper band ascending the spire above the suture, and becoming brown there, and the peristome dark brown. Spire low, convex; suture superficial; whorls 4, the last descending rather abruptly in front. Aperture oblique, wide-lunar; peristome scarcely expanded above, outer and basal margins narrowly expanded, columellar margin adnate.

Alt. 14, diam. 22½ mill.

Guimaras; Panay; Zamboanga, Mindanao; Zebu; Philippines.

H. sirena BECK (in sched. Cuming) Pfr., Symbolæ ii, p. 39; Conchyl. Cab. ii, p. 313, t. 53, f. 14–17; Monogr. i, p. 263.—REEVE,

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Conch. Icon., f. 96.—PHILIPPI, Abbild. i, p. 78, Helix, t. 4, f. 6.—HIDALGO, Journ. de Conchyl. 1887, p. 121—*Chloræa sirena* v. MOLL., Landschn. Fauna Cebu, p. 226 (var. *cebuana*.)

Subglobose, with the whorl less deflexed in front than most species of *Chloræa*. It is very variable in coloring.

Typical *sirena* (figs. 16, 17, 18) has a cream colored or light greenish ground-color, with a single band above the periphery, which is brown on the spire, becoming purplish, green or blackish-green on the body-whorl. There are often dots of translucent-grayish scattered over the surface.

Var. *cebuana* v. Möll. Smaller, a little higher, last whorl not at all angulated, more inflated below; color dull green, with a pale greenish peripheral girdle, bordered above and below with narrow, dark green bands.

Island of Zebu.

Var. *guimarasensis* Pils. (fig. 15). Larger than the type, distinctly angular in front, unicolored yellow, paler toward the white apex. Alt. 16½, diam. 26 mill.

Island of Guimaras.

C. PELEWANA Mousson. Pl. 22, figs. 10, 11.

Imperforate, orbiculate-depressed, striate, *sculptured all over with undulating oblique and subspiral wrinkles;* shining, white, painted above with 3 or 4 *interrupted blackish-brown lines.* Spire obtuse, depressed, the nucleus roseate, polished; suture simple, subimpressed. Whorls 3½, rapidly increasing, a little convex, the last obtusely carinated, abruptly descending at the aperture and somewhat narrowed; at the base rather convex. Aperture oblique (inclined at 60 degrees with the axis), transverse lunate-subcircular, the bands visible inside; peristome acute, expanded, white, sublabiate inside, margin little approaching, joined by a pale, thin callus; right margin expanded, arcuate, columellar margin very oblique, broadly and obtusely thickened, flatly expanded above, adnate.

Alt. 13, diam. 19 mill. (*Mouss.*)

Pelew Is.

H. pelewana MOUSS., Journ. de Conchyl. 1869, p. 58, t. 4, f. 2.—*Chloræa pelewana* PSE., P. Z. S. 1871, p. 474.

The fauna of the Pelew group is essentially *Polynesian*, the occurrence of this and a few other western forms being quite excep-

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tional. *C. pelewana* may prove to belong elsewhere than in *Chloræa*.

C. GMELINIANA Pfeiffer. Pl. 21, figs. 29, 30.

Imperforate, globose-depressed, rather solid, irregularly *rugosely malleated, carinated*, shining, pale green, *girdled with white at the suture and below the carina;* spire subelevated, apex obtuse, whitish; whorls 4½, scarcely convex, gradually increasing, *the last not descending;* base a little flattened; aperture angular-lunar; peristome subthickened, the upper margin narrowly expanded, arched forward; basal margin reflexed; columella sloping, dilated, white calloused.

Alt. 13, greater diam. 23, lesser 20 mill. (*Pfr.*)

Luzon, Philippines.

H. gmeliniana PFR., P. Z. S. 1845, p. 43; Monogr. i, p. 300; Conchyl. Cab., t. 150, f. 10, 11.—REEVE, Conch. Icon., f. 138.

A species known only by the description of Pfeiffer and the figures of Pfeiffer and Reeve. I have italicized the more important portions of the diagnosis. Reeve remarks: A delicate and very characteristic species, of which the surface is irregularly indented throughout. It is of a peculiar light sea-green color encircled by a narrow opaque-white band of epidermis beneath the spiral keel.

(2) GROUP OF C. DRYOPE.

Depressed, rather thin, greenish or bluish, usually banded; *acutely carinated; last whorl strongly deflexed in front;* apex and columella usually dark.

These shells are separated from the *C. reginæ* group of section *Corasia* by the *excessively fine* spiral striation of the surface. The spiral lines are much coarser or more separated in *Corasia*.

C. DRYOPE Broderip. Pl. 22, figs. 1, 2, 3, 4, 5, 6, 7.

Imperforate, much depressed, acutely carinated, rather thin; *light bluish-green, the apical whorl purple-black*, and usually there is a dark band above the carina and a dark columellar spot; the peristome either white or brown. Upper and lower surface about equally convex; under a lens the entire surface is seen to be very finely and very closely, spirally striated. Whorls 4¼, flattened, the last deeply descending in front; aperture subhorizontal, lanceolate-oval; per-

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istome expanded above, reflexed below, the baso-columellar margin adnate, arcuate.

Alt. 12, diam. 27 mill.

Alt. 9, diam. 19 mill.

Province of Cagayan, Luzon; Burias; Tablas, and Sibuyan Philippine Is.

H. dryope Brod., P. Z. S. 1841, p. 37.—Reeve, Conch. Syst. ii, t. 168, f. 10; Conch. Icon., f. 124.—Pfr., Conchyl. Cab., p. 315, t. 54, f. 3, 4.—Desh. in Fér., Hist., t. 102, f. 13, 14.—*H. prasina* Koch, in Phil., Abbild. i, p. 151. t. 5, f. 1.—*H.* (*Chloræa*) *dryope* Hidalgo, Obras Malacol. i, p. 154.

This species resembles some forms of *C.* (*Corasia*) *reginæ*, but the spire is raised, the apex blackish, and the last whorl deeply deflexed in front. It is thinner than the other species of *Chloræa*. Semper did not find the species on the island Burias, whence it was reported by Cuming.

The principal color varieties represented in the suite before me are figured on my plate.

C. cœrulea Möllendorff. *Unfigured.*

Imperforate, depressed, thin, delicately curved striate, decussated by extremely close spiral lines; pellucid, greenish-blue; spire depressed, apex plane, brown; whorls 4, flat, rapidly increasing, the last with a very acute, exserted white carina; base inflated, gibbous before the aperture, greenish, at the columella nodiferous. Aperture oblique, rounded-trapezoidal; peristome yellow, sublabiate, expanded above, expanded a little at the keel, appressed and whitish toward the columella; columella dilated, sloping, purple-brown above, then white, armed at the base with a tooth-like nodule.

Alt. 11; greater diam. 23, lesser 19 mill. (*Möll.*)

Confines of provinces Manila, Bulacan and Morong, Luzon.

Cochlostyla (*Corasia*) *cœrulea* v. Moll. Nachrichtsbl. D. M. Ges. July-Aug., 1888, p. 97.

This species recalls *C. reginæ*, but it is smaller, the last whorl not so much widened; the color is a beautiful sky-blue, tinged with bluish-green, the apex brown; the lip is distinctly but slightly thickened, and of a beautiful yellow as far as the columella; there is a purple-brown spot at the insertion of the columella, and a distinct tooth at its base; finally, there is a nodule-like thickening on the last whorl at the base of the columella. (*v. Möll.*)

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(3) GROUP OF C. PARADOXA.

Body-whorl obtusely or not obviously keeled, its latter half somewhat laterally compressed or flattened at the periphery; *descending toward the aperture;* lip broad.

Closely allied to the group of *C. thersites*, but with the last whorl not acutely keeled, less distorted, and descending in front.

1. *Basal lip with a central strong tooth-like callus within; apical and columellar spots dark; no bands.* C. parodoxa.

2. *Basal lip broad and straightened, without a central tooth; apex and columella white; body-whorl 2-banded.* C. constricta.

3. *Basal lip arcuate, narrower; no color bands or spots.* C. undina.

C. PARADOXA Pfeiffer. Pl. 22, figs. 12, 13, 14.

Imperforate, globose-depressed, solid, *not obviously carinated;* light yellow with a faint tinge of green, *the apex blue-black, a large spot at the insertion of the columella* and a small one at the upper end of the lip, *dark brown;* having a callous thickening at the middle of the baso-columellar lip.

Spire rather elevated, apex obtuse; whorls 5, the last somewhat deflexed in front, obtusely carinated just above the upper insertion of the lip, having a broad shallow constriction just behind the lip. Surface lightly obliquely striated, and showing under a lens excessively fine, close spiral striæ. Aperture very oblique; *lip broadly reflexed,* white; baso-columellar margin adnate, thickened within, and *having a broad tooth or callus* in the middle.

Alt. 13½, diam. 23 mill.

Province of Albay, Luzon, Philippines.

H. paradoxa PFR., P. Z. S. 1845, p. 39; Monogr. i, p. 267; Conchyl. Cab., t. 71, f. 1, 2.—REEVE, Conch. Icon., f. 1419.—PHILIPPI, Abbild. u. Beschreib. i, p. 153, t. 4, f. 7.

Distinguished from *C. constricta* by the absence of brown bands, the whorl less deflexed toward the aperture, and the more prominent callus or wide tooth in the middle of the baso-columellar lip. The lip is more broadly reflexed than in *C. undina*, and the columella straighter, more thickened within.

Form *immaculata* (pl. 21, figs. 27, 28). Whitish, without dark spots at apex and columella, the aperture yellow within.

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C. CONSTRICTA Pfeiffer. Pl. 22, figs. 16, 17.

Imperforate, globose-depressed, solid not carinated; yellow-white, *the apex white*, body-whorl *encircled by two chestnut-brown zones*, one above, the other below the rounded periphery, the upper one ascending the spire; lip white or yellow within; baso-columellar lip straightened, thickened, not toothed within.

Spire rather elevated, apex obtuse; whorls 4½, the last deeply deflexed toward the aperture, sometimes a little angular just above the upper termination of the lip, broadly constricted behind the lip. Surface obliquely striatulate, microscopically, densely, spirally, striated. Aperture very oblique, oval-triangular; lip very broadly reflexed; baso-columellar lip adnate, wide, thickened within, but without a callus or tooth in the middle.

Alt. 14½, diam. 22½, mill.

Alt. 12, diam. 19 mill.

Mindoro, Philippines.

H. constricta PFR., P. Z. S. 1845, p. 39; Conchyl. Cab., t. 69, f. 21, 22; Monogr. i, p. 267 (not *H. constricta* Boub.).—*H. restricta* PFR., Mal. Bl. 1854, p. 258; Monogr. iv, p. 228.—*H. stenopsis* MOQ.-TAND., Rev. et Mag. de Zool. 1856, p. 563.—*Chloræa constricta* SEMPER, Reis. Phil. Landmoll. iii, p. 228.

Allied to *C. paradoxa*, but having the last whorl more deflexed in front, and the baso-columellar lip without a central callous or tooth.

C. UNDINA Pfeiffer. Pl. 22, figs. 8, 9.

Imperforate, globose-turbinate, thin, smooth, shining, whitish-hyaline; spire convex-conoid; whorls 5, a little convex, the last shorter than the spire, slightly deflexed in front; periphery obsoletely angulated, base rather flattened. Aperture very oblique, truncate-elliptical; peristome thin, margins subconniving, the right margin expanded, columellar lightly arcuate, flat, appressed.

Alt. 14½, greater diam. 23, lesser 19 mill. (*Pfr.*)

Philippine Is.

H. undina PFR., P. Z. S. 1856, p. 34; Novit. Conch. i, p. 77, t. 21, f. 10–12; Monogr. iv, p. 208.

Columellar lip more arcuate than in the two preceding species. The shell before me is rather solid, and the lip is broader than shown in Pfeiffer's figures.

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(4) GROUP OF C. THERSITES.

Body-whorl acutely keeled in front, *laterally compressed and distorted* on its latter part, *not descending* toward the aperture.

C. THERSITES Broderip. Pl. 21, figs. 11, 12, 13, 14.

Imperforate, much depressed, *very acutely carinated*, solid; whitish-yellow the apex white or purple-black, having usually four dark-brown bands. Latter third or half of the body-whorl *compressed at the periphery, narrowing and distorting the whorl. Body-whorl not descending in front.*

The surface is finely microscopically striate spirally; whorls 4¼, scarcely convex, the last acutely keeled, and its latter portion much compressed, not descending. Aperture very oblique, subtriangular; peristome thickened, white or yellowish, broadly expanded; basocolumellar margin of the lip white, adnate to the base nearly the whole distance from axis to periphery.

Alt. 15, greater diam. 32, lesser 23 mill.

Calapan, Naujan and Baco, Mindoro, Philippines.

H. (*Carocolla*) *thersites* BROD., P. Z. S. 1841, p. 381.—PFR., Monogr. i, p. 299; Conchyl. Cab., p. 235, t. 112, f. 3, 4.—*Carocolla thersites* RV., Conch. Syst. ii, t. 168, f. 9.—*H. thersites* RV., Conch. Icon., f. 126.—*H.* (*Chlorœa*) *thersites* HIDALGO, Obras Malacol. i, p. 156, t. 23, f. 5–9.

The laterally flattened body-whorl, not descending in front, amply distinguish this from all other forms of *Chlorœa*.

The dark apex and sutural line are pretty constant, although one specimen before me has the apex white. The other bands are very variable, some or all of them being absent occasionally.

Section II. CORASIA Albers, 1850.

Corasia ALB., Die Heliceen, 1850, p. 111.—v. MART. in Albers, Die Hel. 2d. edit., p. 170. (Type *H. virgo*).—PFR., Nomencl. Hel. Viv., p. 199.—*Crystallopsis* ANCEY, Conchol. Exchange, ii, p. 23, August, 1887, (types *H. hunteri, H. allisteri.*)

Imperforate (rarely perforate,) depressed-globose, often carinated; thin, subdiaphanous; whorls 3½–5, rapidly widening, the last scarcely descending; lip slightly expanded or narrowly reflexed. Surface more or less striated spirally, *lacking opaque or "hydrophanous" markings.* Anatomy as in *Cochlostyla* generally.

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Heliciform, depressed thin Cochlostylas, lacking hydrophanous bands, and with the expansion of the lip narrow, compose the section *Corasia*. They are arboreal in habits.

Here may be grouped all of the species of *Cochlostyla* ranging outside of the Philippine Islands; including the group of *H. hunteri, tricolor* and their allies, of the Solomon Islands, a portion of which have hitherto been referred erroneously to *Geotrochus* by Pfeiffer and other authors.

Like all of the sectional groups which have been established in *Cochlostyla*, this section is not well differentiated from several others. Through the group of *C. reginæ* a connection with the section *Chloræa* (*C. dryope, paradoxa*, etc.) is established; and again such species as *C. intorta* lead toward the section *Callicochlias*. In a general way, however, *Chloræa* differs from *Corasia* in its deflexed body-whorl, wide lip, and the frequent presence of apical and columellar dark spots; and *Callicochlias* differs in its more globose form, wider lip and the presence of "hydrophanous" cuticle.

The species may be thrown into four groups;

1. *Group of C. lactiflua*, Solomon Is.
2. *Group of C. extensa*, Moluccas and New Guinea.
3. *Group of C. reginæ*, Philippines.
4. *Group of C. virgo*, Philippines.

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(1) Group of C. lactiflua.

Thin shells of glassy texture, light colored, usually translucent-whitish, sometimes varied with brown. Axis perforate or closed; form varying from globose-turbinate to depressed, the periphery carinated; apex obtuse; whorls 3½–5. Surface generally showing spiral striæ. Lip reflexed, at least below. Distribution, Solomons and some adjacent islands.

The shell characters given above define a natural group, the various species of which have heretofore been distributed by authors in *Geotrochus* and *Corasia*.

Mr. C. F. Ancey has proposed as a genus or subgenus the name *Crystallopsis* for *H. hunteri* and *H. allisteri;* but the characters he assigns do not cover the group as here understood.

C. hunteri Cox. Pl. 13, figs. 41, 44, 45.

Umbilicus open, deep, half-surrounded by the broad curved columellar lip; globose-depressed, carinated, thin, whitish-translucent.

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Surface nearly smooth, lightly striatulate, and showing fine impressed spiral lines under a lens. Translucent-whitish, with a narrow opaque-white band at the subacute peripheral keel. Spire low; apex obtuse; whorls 4, slightly convex, the last not descending in front, convex below; aperture but little oblique, large, truncate-oval; lip thin, expanded, the columella arcuate, subvertical, very broadly expanded and half surrounding the umbilicus, but not covering it. Alt. 15½, greater diam. 21, lesser 17½ mill.

Guadalcanar, Solomon Islands.

H. hunteri Cox, P. Z. S. 1871, p. 646, t. 52, f. 11.—Pfr., Monogr. vii, p. 377.—Dohrn in Conchyl. Cab., p. 583, t. 172, f. 5, 6.

Differs from the other species of *Corasia* which are white and subtranslucent, in having the columellar lip produced in a broad plate, somewhat as in *H. grata* Mich.

C. allisteri Cox. *Unfigured.*

Shell with a deep narrow concealed umbilicus, semiglobose, smooth, transversely very finely striated with lines of growth; the whorls of the apex also longitudinally finely striated, translucent; pale straw-colored, ornamented above and below with numerous rather narrow opaque white and clear bands; whorls 5, rapidly increasing in size, the last much inflated and obtusely carinated, not depressed in front, convex above and below; aperture ovately rounded, subangulated at the periphery, showing the opaque and clear zones within; peristome smooth and shining; lip very broadly expanded and reflexed; margins approximate, upper attached to the carina of the body-whorl, columellar broadly dilated, overhanging and concealing the umbilicus. Diam., greatest 0·98, least 0·64; height 0·60 of an inch. (*Cox.*)

Solomon Islands (Mus. Cox.)

This beautiful species may be at once distinguished by the very peculiar alternate opaque white and clear zones. Amongst a large number of specimens procured, I have not found one to vary in this respect. (*Cox.*)

H. allisteri Cox, P. Z. S. 1873, p. 564.

H. vitracea Férussac. Pl. 13, figs. 52, 53.

Shell covered perforate, globose, thin, vitraceous, carinated. Whorls 4½,–5, a little convex; aperture lunate-elliptical; peristome simple, a little reflexed. (*Dh.*)

Australia?

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H. vitracea FER., Prodr. 146; Hist., t. 64, f. 5.—DH. in text of same, i, p. 340.—PFR., Mon. Hel. Viv. i, p. 233 (desc. from fig.); Conchyl. Cab., t. 76, f. 20, 21 (copied from Fér.).—COX, Mon. Austr. L. Sh., p. 109, t. 11, f. 20, 20a, (copied from Fér.)

Known solely by the original figures in Férussac's Histoire, which are copied on my plate.

C. SUBVITREA Pfeiffer. Pl. 13, figs. 54, 55.

Shell umbilicate, trochiform, rather solid, obliquely distinctly striated, decussated with close, very fine spiral striæ, satiny, buffish-hyaline; spire convex-conic, rather obtuse. Whorls 6, a little convex, slowly increasing, having an exserted cord-like carina; the last whorl slightly deflexed in front, more convex below the median carina, a little turgid in front, subcanaliculate toward the narrow umbilicus. Aperture very oblique, subtriangular-lunar; peristome white, shining, the margins remote; right margin expanded a little, columellar margin substraightened, outwardly reflexed, subdentate within, dilated in a vaulting, vitreous plate at the insertion.

Alt. 15, greater diam. 20½, lesser 19 mill. (*Pfr.*)

Moluccas.

H. subvitrea PFR., P. Z. S. 1854, p. 148; Monogr. iv, p. 253; Novit. Conch. i, p. 8, t. 3, f. 8, 9.—REEVE, Conch. Icon., t. 194, f. 1361.

The locality should be confirmed. This shell has much the aspect of *H. (Satsuma) japonica*, judging from the figures.

H. CYMODOCE Crosse. Pl. 13, figs. 39, 40.

Imperforate, turbinate-trochiform, rather thin, subpellucid, longitudinally minutely striatulate; dull yellowish-white; spire subconic, apex pale violaceous, suture impressed; whorls 5, a little convex, the last slightly descending, *ventricose*, longer than the spire, *obtusely carinated below the middle*, having a pale violaceous zone below the carina, but little conspicuous. Base moderately convex, spirally very delicately decussated. Aperture oblique, lunate-subquadrate; peristome milk-white, margins distant, columellar margin dilated, basal and outer margins narrowly reflexed.

Alt. 17, greater diam. 22, lesser 18 mill. (*Crosse.*)

Habitat unknown.

H. cymodoce CR., Journ. de Conchyl. 1869, p. 184; 1870, p. 102, t. 2, f. 3.

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H. LACTIFLUA Pfeiffer. Pl. 13, fig. 36.

Shell imperforate, globose-turbinate, acutely carinated at the periphery; thin, translucent-whitish, having a narrow opaque milk-white band at the carina.

Surface smooth, lightly marked by oblique growth-lines, and under a lens seen to be finely spirally striated, these striæ usually obsolete on the last whorl. Apex obtuse. Whorls 4–4¼, convex, the last not descending in front, or but slightly descending. Aperture large, rounded-rhomboidal, oblique; outer and basal margins of the white peristome evenly reflexed, becoming wider toward the base of the nearly vertical columella, the face of which is flattened and distinctly excavated, the columella is deeply inserted in the base, and the axis is narrowly perforated in young shells.

Alt. 20, greater diam. 23 mill.

Alt. 17, greater diam. 22 mill.

New Georgia and Ysabel, Solomon Is.

H. lactiflua PFR., P. Z. S. 1861, p. 190; Novit. Conch., p. 175, t. 47, f. 7, 8; Monogr. v, p. 270.—*H. isabellensis* SOUV., Journ. de Conchyl. 1863, p. 74, 173, t. 5, f. 1.—PFR., Monogr. v, p. 270.

A turbinate, glassy-white shell, having a white line at the acute carina. The face of the columella is flattened and excavated below. There are sometimes inconspicuous linear whitish streaks, in the direction of the growth-lines.

I am unable to separate *H. isabellensis* (pl. 13, fig. 37, 38) from *lactiflua*. Being from a different island (*Ysabel*) it may prove to be a variety, but the characters assigned to it afford no distinctive marks whatever, so far as I can see.

H. PURCHASI Pfeiffer. Pl. 13, figs. 46, 47.

Imperforate, ovate-depressed, very thin, very closely plicatulate, subdecussated by spiral lines, pellucid, whitish corneous. Spire short-conoid, obtuse; suture impressed, margined. Whorls 3½ to 4, rapidly increasing, convex, the last large, not descending in front, encircled by a milk-white, acute, compressed peripheral carina; beneath inflated, the base gibbous; aperture large, oblique, angulate-lunar; peristome thin, shortly expanded, basal margin a little reflexed, columella arcuate, compressed, slightly calloused.

Alt. 13–14, greater diam. 22–23, lesser 17–17½ mill. (*Dohrn.*)

Admiralty Islands.

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H. purchasi PFR., P. Z. S. 1858, p. 21, t. 40, f. 4; Mon. Hel. Viv. v, p. 271.—DOHRN in Conchyl. Cab., p. 590, t. 173, f. 7, 8.

A thin, clear horn-colored species.

C. ROSSITERI Angas. Pl. 21, fig. 26.

Shell imperforate, globosely conical, very thin, obliquely irregularly plicately striated, with the interstices very finely transversely striated, pale straw-color encircled with numerous narrow white diaphanous bands, the one nearest the sutures the broadest; spire obtusely conoidal, somewhat flattened at the apex; whorls four convex, the last descending, acutely keeled at the periphery, rounded at the base; columellar margin arcuate, narrowly excavated, sharp within; aperture oblique, rhomboidal; peristome not continuous, white, with a purplish rose-colored spot at the periphery, and another at the junction of the right margin with the body-whorl. Diam. maj. 10, min. 8, alt. 7½ lines. (*Angas.*)

Ysabel Island, Solomon Group.

H. rossiteri ANG., P. Z. S. 1869, p. 46, t. 2, f. 5.

This species belongs to the same group as *H. tricolor* Pfr., and *H. purchasi* Pfr.

C. WISEMANI Brazier. *Unfigured.*

Shell imperforated, globosely depressed, thin, obliquely finely striated, shining, diaphanous, yellowish-white; obtuse at the apex; whorls 3½, rather flat, rapidly increasing, the last very large, rounded at the periphery, marked with faint opaque white lines running into the suture, aperture oblique, ovately rounded, peristome reflected, whitish-brown, margins joined with thin callus, the right curved down, columellar margin rounded and broadly expanded, the upper part of the peristome from the centre takes a peculiar bend inwards. (*Braz.*) Alt. 14, greater diam. 28, lesser 22 mill.

Solomon Archipelago.

H. (*Corasia*) *Wisemani* BRAZIER, Proc. Linn. Soc. N. S. Wales, i, p. 3, 1876.

Described from a single specimen, in the collection of Mr. Chas. Coxen, of Brisbane.

C. APHRODITE Pfeiffer. Pl. 23, figs. 8, 9, 10, 11, 12.

Shell imperforate, depressed, thin, acutely keeled at the periphery; translucent-whitish under a thin, pale straw-colored epidermis. Surface shining, lightly striatulate and having very obsolete close

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microscopic spiral lines, scarcely visible on the last whorl. Spire very low, apex flat. Whorls 3½, the last scarcely descending in front, and encircled by an acute, compressed white keel.

Aperture oblique; lip white, narrowly reflexed throughout, dilated at the columellar insertion closing the axial perforation.

Alt. 17, greater diam. 35, lesser 27½ mill.

San Christoval, Solomon Is.

H. aphrodite PFR., P. Z. S. 1859, p. 26, t. 44, f. 2; Mal. Bl. 1859, p. 27; Monogr. v, p. 308, 499.

A depressed, light, *Carocolus*-shaped shell, having much the aspect of *C. virgo* of the Philippines. The thin epidermis is apparently caducous to a greater or less degree. The whorl is constricted or grooved just behind the expanded upper lip.

A variety (figs. 11, 12) is smaller, more elevated, the last whorl considerably deflexed at the aperture.

Alt. 15½, greater diam. 27, lesser 22½ mill.

C. ANADYOMENE Adams & Angas.

Shell orbicular, depressed-conic, imperforate, white, covered with a thin, pellucid, straw-colored epidermis. Whorls 4, plane, longitudinally very delicately striated; the last whorl dilated in front, constricted at the lip, at the periphery angulated and ornamented with a conspicuous filiform carina. Aperture subquadrate, callus of the inner lip covering the umbilical region; outer lip angulated in the middle, margin deeply reflexed and thickened.

Alt. 12½, diam. 25 mill. (*Ad. & Ang.*)

Guadalcanar and Ugi, Solomon Is.

H. anadyomene A. & A., P. Z. S. 1864, p. 38.—PFR., Monogr. v, p. 308.—*H.* (*Corasia*) *anadyomene* SMITH, P. Z. S. 1885, p. 591.

This species has not been figured. It differs from *H. aphrodite* in having the whorls more convex, the keel and peristome not opaque white, and the aperture less produced and angular.

C. PSYCHE Angas. Pl. 23, figs. 13, 14.

Shell imperforate, depressed, thin, obliquely irregularly plicately striated, pellucid, white, covered with a yellowish-brown shining epidermis; spire scarcely elevated, obtuse at the apex; whorls 3, flatly convex, margined at the sutures, the last not descending, prominently keeled at the periphery, flattened above and ventricose below; columellar margin arcuately descending, narrowly excavated,

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sharp within; aperture large, oblique, subovate; peristome not continuous, white, slightly reflected, the upper margin nearly straight, not flexuous. (*Ang.*)

Alt. 14, greater 26, lesser 18 mill.

New Georgia, Solomon Is.

H. (*Corasia*) *psyche* ANGAS, P. Z. S. 1869, p. 624, t. 48, f. 1.

This species, which I have received from Dr. James Cox of Sydney, New South Wales, is somewhat intermediate between *H. aphrodite* Pfr. and *H. purchasi* Pfr. It differs from the former in being much flattened above and very ventricose below, and especially in the form and amplitude of the aperture, and from the latter in texture, form of spire, color, and size. (*Ang.*)

C. BALCOMBEI Cox. Pl. 23, fig. 15.

Shell imperforate, depressed, almost flat above, convex below, very thin, glossy, pale straw-colored, coarsely striated above and below with regular oblique transverse striæ, and longitudinally with strongly marked very slightly waved striæ, giving by their decussation a granular appearance to the surface of the shell; spire scarcely raised, suture impressed; whorls 4, slightly convex above, rapidly increasing in size; last whorl inflated below, and very prominently and sharply keeled, the keel edged with an opaque white line; base rounded; aperture large, subtrapezoidal, acutely angled at the periphery; peristome slightly thickened and everted, upper margin attached to the carina of the last whorl; columella dilated, appressed, and indented over the umbilical region. (*Cox.*)

Alt. 0·48, greater diam. 1·09, lesser 0·78 inch.

Solomon Is.

H. (*Corasia*) *balcombei* Cox, P. Z. S. 1873, p. 565, t. 48, f. 4.

C. TRICOLOR Pfeiffer. Pl. 23, figs. 1, 2, 3, 4, 5, 6.

Shell imperforate, depressed, thin but rather solid, acutely keeled at the circumference; translucent-whitish, having numerous close spiral lines of opaque white above and below, the keel opaque white bordered with lines of brown and articulated with brown dots; lip brown.

Surface lightly obliquely striatulate, conspicuously closely and finely spirally striated. Spire low, the apex flattened. Whorls 4, the last wide, a little deflexed in front; strongly contracted toward the aperture above and at the carina; base more or less swollen or gibbous around the columella. Aperture oblique, triangular; per-

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istome edged with brown, the *upper margin not expanded*, basal margin narrowly expanded, columellar margin wide, flat, brown, *thickened within by a wide callus* which is more or less abruptly truncated below.

Alt. 14, greater diam. 30, lesser 24½ mill.

San Christoval, Ugi and Santa Anna, Solomon Is.

H. tricolor PFR., P. Z. S. 1849, p. 129; Conchyl. Cab., t. 124, f. 22–24; Monogr. iii, p. 168; *l. c.* iv, p. 193.—REEVE, Conch. Icon., f. 431.—E. A. SMITH, P. Z. S. 1885, p. 589, (var. *picta*.)

This is a variable shell both in form and coloring. The outline seen from above or below is often more oblong than the figures show. The suture is white-margined, sometimes articulated with brown. The circum-columellar swelling is often strongly developed, often obsolete.

Color var. White spiral lines inconspicuous; carina white, without brown border or spots. Smaller than the type. Diam. 25–27 mill.

Santa Anna; San Christoval.

Color var. Similar to the last, but the white peripheral stripe bordered with brown, not articulated.

San Christoval.

Color var. PICTA Smith, Pl. 18, figs. 69–71.

Undulating reddish-brown stripes above and below, distinctly visible within the aperture.

Northern coast of San Christoval.

Var. TRANSENNA Pilsbry. Pl. 23, figs. 16, 17, 18, and fig. *between* 2 and 5.

Shell imperforate, depressed, low-conic above, convex beneath, acutely keeled at the periphery; thin; translucent-whitish, having numerous spiral bands and lines of opaque-white; keel white, bordered above and below with irregularly clouded brown stripes.

Surface having light growth-lines, decussated by conspicuous and close spiral striæ. Spire conic, apex obtuse. Whorls 4, the last not deflexed in front, its periphery slightly contracted at the aperture; base convex, not gibbous around the columella. Aperture oblique, subtriangular, the peristome brown-edged, its upper margin not expanded; basal margin expanded, columella dilated, its face flattened and having a shallow vertical groove or excavation, its inner edge

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steeply obliquely descending, straight, forming an angle at its junction with the basal margin.

Alt. 14½, greater diam. 25½, lesser 20½ mill.

Solomon Is.

This form is smaller and more elevated than *C. tricolor*, the columella is very much slenderer, much less thickened, and mostly white. The structure of the columella is so different that I am inclined to believe the shell specifically distinct. The young have no brown markings save a small columellar spot.

(2) GROUP OF C. EXTENSA.

Part of the following species have been included by authors in *Albersia;* but their characters seem more in accord with *Corasia* than with the other group. Distribution, Moluccas and New Guinea.

C. CONFORMIS Férussac. Pl. 19, figs. 4, 5, 3.

Shell imperforate, globose-depressed, carinated, thin, obliquely closely striated, diaphanous, whitish, covered with a pale brownish epidermis; spire little elevated, apex very obtuse; suture impressed; whorls 3½, rapidly increasing, slightly convex, the last large, not descending, convex beneath. Columella subvertical, compressed, subexcavated; aperture ample, oblique, lunar-subrotund, having a pearly luster inside; peristome simple, shortly reflexed.

Alt. 20, greater diam. 34, lesser 28 mill. (*Pfr.*)

New Guinea.

H. conformis FER., Prodr., p. 33; Histoire, t. 25a, f. 10.—FER. in QUOY & GAIMARD, (Freycinet) Voy. autour du Monde, l'Uranie et la Physicienne, Zool., p. 467; Atlas, t. 67, f. 4, 5.—WOOD, Index Test., p. 22, t. 7, f. 37.—PFR., Conchyl. Cab., p. 42, t. 72, f. 1–3; Monogr. i, p. 293; iii, p. 203; vii, p. 355; Zeitschr. f. Mal. 1849, p. 76.—RVE., Conch. Icon., f. 497.—MARTENS, Ostas. Landsch., p. 393.—*Corasia conformis* WALLACE, P. Z. S. 1865, p. 412.—*H.* (*Corasia*) *conformis* ALB., Die Hel., p. 111.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 158, t. 8, f. 1, 8, 15 (Anatomy.)

C. LEUCOPHTHALMA Pfeiffer. Pl. 26, figs. 16, 17.

Imperforate, subconoid-depressed, carinated, thin, obliquely striated and under a lens most delicately granulated; spire white, shortly conoid-elevated, apex obtuse; suture little impressed, indistinctly and delicately white-edged. Whorls nearly 4, little convex, rapidly increasing, the last not descending, subacutely carinated,

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(the carina becoming more obtuse); covered with a thin, tawny cuticle, irregularly streaked and four-banded with brown; base more convex; columella little oblique, compressed, subexcavated; aperture oblique, wide lunar, the right side obsoletely angulated, inside bluish-pearly, shining; peristome simple, narrowly reflexed, upper margin curving forward, basal margin forming an obtuse angle with the columella.

Alt. 21–22, greater diam. 42, lesser 34 mill. (*Pfr.*)

Celebes?

H. leucophthalma Pfr., Mal. Bl. xvii, 1870, p. 93; Novit. Conch. iv, p. 10, t. 111, f. 8, 9; Monogr. vii, p. 335.

H. extensa Müller. Pl. 27, figs. 9, 10, 11.

Shell imperforate, globose-depressed, rounded at the periphery, thin but rather solid; white under a fugacious yellowish epidermis; surface shining, very lightly striatulate, having faint, almost obsolete spiral striæ, seen only under a strong lens. Spire low, apex obtuse; whorls 4, the last globose, a little descending in front. Aperture large, oblique; peristome narrowly expanded and subreflexed throughout; the columella steeply sloping, straight, somewhat thickened, forming a decided and conspicuous angle at its junction with the basal margin.

Alt. 21, greater diam. 27½, lesser 22½ mill.

Alt. 19, greater diam. 26, lesser 21 mill.

Island of Goram. (Wallace.)

H. extensa O. Fr. Mull., Hist. Verm., p. 60.—Desh. in Fer., Hist., t. 96, f. 5–7.—Pfr., Monogr. iii, p. 193; Conchyl. Cab., p. 193, t. 160, f. 6, 7.—Martens, Ostas. Zool., Landschn., p. 331.

A larger shell than *H. najas*, more flattened above, and with the columella more thickened, straighter and longer, forming a decided angle with the basal margin.

The axis is perforated in young shells, although from the appearance of adults one would not suspect this to be the case.

Part of the specimens before me are marked ".New Ireland," I know not on whose authority.

C. cœlaxis Pilsbry. Pl. 26, figs. 6, 7, 8.

Shell imperforate but having a hollow axis, globose-depressed, thin, light, covered with a thin cuticle of a very delicate greenish-yellow tint, becoming white on the spire; the suture bordered below by a

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distinct buff-white margin about 1 mill. wide on the last whorl. Surface nearly lusterless, delicately obliquely striate, decussated by obsolete spiral striæ. Spire low, apex obtuse. Whorls 4, the last slowly descending in front, rounded at the periphery, a little concave in the center beneath. Aperture large, oblique; upper margin of the peristome slightly expanded, basal subreflexed, the columellar margin reflexed and closely adnate, closing the umbilicus by a thin, convex, dilated plate. Inner edge of the columella concave, not angled where it passes into the basal margin.

Alt. 20, greater diam. 23, lesser 20½ mill.

Java. (A. D. Brown coll.)

This species differs from its allies in having the axis perforated, the perforation closed in the adult by a thin convex plate (fig. 8). It is described from the collection of the late A. D. Brown, now in the Academy Museum.

H. NAJAS Pfeiffer. Pl. 27, fig. 13 (var. fig. 12); pl. 28, figs. 31, 32.

Shell *depressed-globose*, thin, regularly lightly sculptured with close striæ; *yellowish-white;* spire short, obtuse; whorls 4, a little convex, rapidly increasing, the last inflated, somewhat descending in front; aperture oblique, large, subrotund; peristome thin, narrowly expanded throughout, the upper margin arcuate, columellar margin subvertical, lightly thickened, (*v. Mart.*)

Alt. 18½, greater diam. 25, lesser 19 mill.

Alt. 22, greater diam. 31, lesser 23 mill.

Amberbaki, New Guinea; Islands of Buru and Goram, Moluccas.

H. najas PFR., Symbolæ iii, p. 71, 1846; Monogr. i, p. 261; Conchyl. Cab., t. 53, f. 12, 13.—PHILIPPI, Abbild. etc., ii, t. 9, f. 5.—MARTENS, Preuss. Exped. Landschn., p. 330, t. 18, f. 4.—TAPPARONE CANEFRI, Ann. Mus. Civ. di Stor. Nat. di Genov. xix, p. 187, 1883.

A thin, shining species, allied to *H. extensa, H. obliquata* and *H. physalis.* Numerous specimens are before me, showing considerable variation in contour both in the direction of *H. physalis* and *H. obliquata.* These three species may perhaps prove to be connected by intermediate forms.

C. PHYSALIS Pfeiffer. Pl. 27, figs. 2, 3.

Imperforate, globose-depressed, thin, striatulate and under a lens seen to be minutely punctulate somewhat shining, translucent, very pale greenish-white. Spire very shortly elevated, convex, obtuse;

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suture light, impressedly-margined. Whorls 4, a little convex, rapidly increasing, the last depressed-globose, visibly a little descending in front; columella white, straightened, oblique, compressed, excavated above; aperture oblique, lunate-subcircular, with a pearly luster inside; peristome thin, margins converging, the upper margin curving forward, narrowly expanded, basal margin reflexed, forming an obsolete angle with the columella.

Alt. 16, greater diam. 27, lesser 22 mill. (*Pfr.*)

Tular [Talaur ?] Islands.

H. physalis Pfr., Mal. Bl. xviii, 1871, p. 123; Novit. Conch. iv, p. 73, t. 121, f. 10, 11; Monogr. vii, no. 2316.

Allied to *H. najas*, *obliquata* and *extensa* but much more depressed, the last whorl less inflated, little descending, columella much sloping, forming a very obsolete angle with the basal margin. (*Pfr.*)

H. obliquata Deshayes. Pl. 27, figs. 14, 15.

Shell subglobose, pure white, delicately striate; spire short, obtuse; whorls 4, nearly flat, the last large, inflated, obliquely deflexed toward the aperture; base imperforate. Aperture ovate-lunar, dilated in the middle, coarctate posteriorly; peristome margined, narrowly reflexed, base covered with a short callus.

Alt. 22, diam. 27 mill. (*Desh.*)

Habitat unknown.

H. obliquata Dh. in Fér., Hist. i, p. 219, t. 28a, f. 3, 4.—Pfr., Monogr. iii, p. 192.

(3) Group of C. reginæ.

Acutely carinated forms, flattened above, of a more or less pronounced green tint; lip white; surface seen under a lens to be distinctly spirally striated, often obliquely corrugated.

C. reginæ Broderip. Pl. 25, figs. 45, 46.

Imperforate, depressed, plano-convex above, convex below; thin; of a bright bluish-green color, the apical 1½ whorls and the lip white. Surface delicately obliquely striatulate, obsoletely, very finely spirally striated. Whorls 3½, the last acutely keeled, slightly concave above and below the keel, not descending in front, tumid beneath. Aperture subtriangular-lunar; peristome thin, outer margin expanded, baso-columellar margin adnate, slightly thickened within, dilated over the umbilicus. Alt. 11, greater diam. 28, lesser 22 mill.

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Is. Catanduanes and Potillo, off E. coast of Luzon (Moll.); *Baler Casiguran and Cordillera, Ambubuk, on the E. coast of N. Luzon* (Semper); *Albay, Luzon; also Sibonga, Zebu?* (Cuming.)

H. reginæ BROD., P. Z. S. 1841, p. 36.—PFR. in Conchyl. Cab., t. 68, f. 8–11; Monogr. i, p. 299.—REEVE, Conch. Icon., f. 125.—*Caracolla reginæ* Rv., Conch. Syst, ii, t. 167, f. 2.—*Cochlostyla reginæ* MARTENS in Mal. Bl. xv, p. 162, 1868.—*Cochlostyla* (*Corasia*) *reginæ* SEMPER, Phil. Archip. Landmoll. iii, p. 168.—v. MOLL., Ber. Senck. Nat. Ges. 1890, p. 229.—*Helix* (*Chloræa*) *reginæ* HIDALGO, Obras Malacol., p. 153, t. 24, f. 3, 4.—*H. smaragdina* GRAT., Act. Soc. Bord. xi, p. 405, t. 3, f. 26, 27. (Young.)

The bright bluish-green hue of this species distinguishes it for beauty, even in this genus where vividly colored shells are the rule. The typical *reginæ* has the apical whorls white, and the periphery has no bands. I am disposed to follow Hidalgo in considering the following two forms geographic varieties rather than distinct species.

Var. ALMÆ v. Moll. Pl. 25, figs. 42, 43, 44.

Spire flatter, the apex purple-brown; last whorl encircled by a brown girdle, and descending a little in front.

Alt. 11½, greater diam. 30 mill.

Algeria and Boljoon, Zebu; Puerto Galera, Mindoro.

H. reginæ var. b, PFR., Monogr. i, p. 299.—? FER., Hist., t. 102, f. 15, 16.—*Cochlostyla almæ* v. MOLL., Landschn. Fauna Cebu, p. 227, t. 8, f. 5.—*H.* (*Chloræa*) *reginæ var. almæ* HIDALGO, Obras Malacol. i, p. 153.

This variety forms a transition toward certain forms of *C. dryope*.

Var. ELIZABETHÆ O. Semper. Pl. 25, figs. 47, 48.

Shell larger, the carina more acute, and the spire flat.

Alt. 14, diam. 38 mill.

Island of Calayan, off Northern Luzon.

Cochlostyla (*Corasia*) *elizabethæ* O. SEMPER, Journ. de Conchyl. 1866, p. 261, t. 8, f. 2.—C. SEMPER, Phil. Archip. Landmoll. iii, p. 168.—*H. elizabethæ* PFEIFFER, Monogr. v, p. 307.—*H.* (*Chloræa*) *reginæ var. elizabethæ* HIDALGO, Obras Malacol. i, p. 154.

C. PAPYRACEA Broderip. Pl. 24, figs. 34, 35, 36.

Imperforate, convexly flattened above, acutely carinated at the periphery; thin, white, under a very light greenish-buff tinted cuticle, having a small brown dot at the apex. Surface delicately

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obliquely striated, decussated by spiral striæ, some of which are rather prominent, readily seen without a lens. When magnified the surface is seen to be finely, obliquely corrugated in a direction at right angles to the lines of growth. Whorls 4, the last somewhat concave immediately above and below the keel, not descending in front; columella surrounded by a conspicuous swelling or ridge. Lip white, narrowly expanded, columellar margin dilated, arcuately sloping. Alt. 13½, diam. 26½, lesser 21 mill.

Mindoro, Philippines.

Carocolla papyracea BROD., P. Z. S. 1841, p. 36.—*Helix papyracea* PFR. Symb. iii, p. 70; Conchyl. Cab., t. 52, f. 11, 12; Monogr. i, p. 218.—REEVE, Conch. Icon., f. 90.—*H.* (*Corasia*) *papyracea* HIDALGO, Obras Malacol. i, p. 147, t. 21, f. 1, 2.—*Cochlostyla* (*Corasia*) *papyracea* SEMPER Phil. Archip. Landmoll., iii, p. 168.—MOLL., Mal. Bl. (new ser.) x, p. 160; Landschn. Fauna Cebu, p. 229 (var. *dilatata*)—? *H. acutangula* BURROW, Elem. Conch., t. 26, f. 1.

This is like *C. reginæ* in form, but less depressed and more swollen around the columella; the color is a very light tint of buff, faintly tinged with green.

Var. DILATATA v. Möll. Larger and flatter than typical *papyracea*, the keel more produced, last whorl more widened. Alt. 14, greater diam. 31 mill.

Zebu, Philippines.

C. PSITTACINA Deshayes. Pl. 25, figs. 49, 50, 51.

Imperforate, orbiculate-depressed, thin, obliquely closely striate and decussated with spiral striæ visible under a lens, subpellucid, shining; greenish-buff above and below; the middle of the last whorl vivid blue; spire convex, obtuse; suture slightly impressed; whorls 4½, slightly convex, the last more convex, subangular at the periphery, not descending in front. Aperture oblique, subtrigonal-elliptical; peristome simple, thin, margins remote, the right margin expanded, columellar margin arcuately sloping, compressed, dilated, adnate, whitish. Alt. 15, greater diam. 25, lesser 19 mill.

Cordillera of Palanan, Northern Luzon.

H. psittacina DH., Journ. de Conchyl. 1861, p. 350, t. 16, f. 3–5. PFR., Monogr. v, p. 285.—*Cochlostyla* (*Corasia*) *psittacina* SEMPER, Phil. Archip. Landmoll. iii, p. 172 (with var.)

Allied to the group of *C. reginæ* by coloring and general form, but differing in the more globose and *obtusely* keeled body-whorl.

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(4) GROUP OF C. VIRGO.

Globose-depressed shells, varying from acutely carinated to obtusely subangular or rounded; thin, very light colored; surface showing more or less obsolete spiral lines on the earlier whorls, not distinct on the last; not microscopically obliquely wrinkled or corrugated. Whitish (or varying toward greenish or yellowish), unicolored or 1, 2 or 3-banded.

Includes most of the species of the Philippine Islands.

C. VIRGO Broderip. Pl. 24, figs. 29, 30.

Imperforate, depressed, low-convex above, convex beneath, acutely keeled at the circumference; thin, entirely white (covered with a thin yellowish cuticle when fresh), the lip narrowly edged with dark brown. Surface shining, smooth, obliquely striatulate, showing under a strong lens almost obsolete traces of spiral lines on the earlier whorls. Whorls 4. Aperture oblique; lip very narrowly expanded, brown-edged; columellar lip widened, flat, nearly straight, white. Alt. 18, greater diam. 32, lesser 27 mill.

Is. of Negros; Western Zebu; Zamboanga, Mindanao.

Carocolla virgo BROD., P. Z. S. 1841, p. 44.—REEVE, Conch. Syst. ii, t. 168, f. 13.—*H. virgo* PFR. in Conchyl. Cab., t. 68, f. 1, 2; Monogr. i, p. 217.—RV., Conch. Icon., f. 89.—DESH. in Fér., Hist., t. 101, f. 13–15.—*H.* (*Corasia*) *virgo* HIDALGO, Obras Malacal. i, p. 147, t. 22, f. 1.—*Cochlostyla* (*Corasia*) *virgo* SEMPER, Phil. Archip. Land Moll., iii, p. 166.—v. MOLL., Landschn. Fauna Cebu, p. 229.

This pure white shell with narrowly brown-bordered outer lip is quite distinct from other carinated species. The surface is almost free from spiral sculpture. The spire is sometimes much depressed.

C. DEALBATA Broderip. Pl. 21, fig. 36.

Shell dull white, slightly yellowish, subdiaphanous, subglobose, substriated with very close oblique growth-lines; slightly subumbilicated; aperture auriculate, large, lip-edge slightly substriated.

Alt. 21, diam. 37½ mill. (*Brod.*)

Island of Siquijor, Philippines.

H. (*Carocolla*) *dealbata* BROD., P. Z. S. 1841, p. 45 (not *Helix dealbata* LOWE, 1830).—*H. Broderipi* REEVE, Conch. Icon., f. 88, (not *H. broderipi* Pfr.)

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Hidalgo has already (Obras i, p. 147) raised the question of the identity of the *H. broderipi* of Pfr. and *H. broderipi* Reeve. They seem to me perfectly distinct; and I have, therefore, restored the original name given by Broderip to the form figured in the Iconica, which represents Broderip's species. The name is not preoccupied in the genus *Cochlostyla*.

C. CASTA Pfeiffer. Pl. 25, figs. 37, 38.

Imperforate, depressed, about equally convex above and below, carinated, striatulate and obsoletely malleated, shining, white under a fugaceous pale yellowish epidermis; suture linear, chalky-white; whorls 4, nearly flat, the last obsoletely angled at the suture and below the carina; columella short, sloping, excavated; base subtortuous; aperture subtrapezoidal; peristome expanded, white, basal margin slightly arcuate, forming an angle with the columella.

Alt. 23, greater diam. 47, lesser 38 mill. (*Pfr.*)

Philippines.

H. casta PFR., P. Z. S. 1848, p. 110; Conchyl. Cab. t. 123, f. 1, 2; Monogr. iii, p. 206.—REEVE, Conch. Icon. f. 86.

A large form, not yet found by recent collectors. The entire surface of the shell is superficially indented or malleated.

C. PUELLA Broderip. Pl. 24, figs.22, 23, 25; pl. 25; fig. 39.

Imperforate, globose-depressed, carinated at the periphery, thin, white under a very thin, deciduous yellowish cuticle, having a brown band at the peripheral angle, becoming evanescent on the earlier part of the body-whorl. Surface smooth, very delicately striated, and showing under a lens fine spiral lines on the earlier whorls. Suture linear, white. Whorls 4, nearly flat, the last carinated, descending a little below the carina at the aperture. Aperture oblique, subtrigonal-lunar; peristome thin, narrowly expanded; columella wide, flat, its inner edge straight, oblique, forming an angle with the basal margin.

Alt. 19½, greater diam. 31, lesser 26 mill.

Island of Camiguing; Lianga, Rio Salos, Rio Jibon, Pusian, Baubo, Rio Agusan, Island of Mindanao, Philippines.

Carocolla puella BROD., P. Z. S. 1841, p. 45.—*H. puella* PFR. Symb. iii, p. 74; Conchyl. Cab. t. 68, f. 3–5; Monogr. i, p. 298.—REEVE, Conch. Icon. f. 66.—*H.* (*Corasia*) *puella* HIDALGO, Obras Malacol. i, p. 148, t. 21, f. 4.—*Cochlostyla* (*Corasia*) *puella* SEMPER, Reisen in Archip. Phil., Landmoll. iii, p. 167.

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Allied to *C. virgo*, but the carina is more obtuse and the lip white. Specimens from Mindanao are more depressed, and sometimes larger than the types, measuring over 40 mill. diam. according to Hidalgo. See pl. 25, fig. 39

Var. LAIS Pfr. Pl. 25, fig. 40.

Similar to *C. puella* but more globose, the peripheral angle more obtuse; columella more arcuate at base, not forming so distinct an angle with the basal margin as *C. puella*. Peripheral band more prominent.

Mindanao, Philippines.

H. lais PFR., P. Z. S. 1853, p. 49; Monogr. iii, p. 647.—RVE. f. 1016.—HIDALGO, Obras Malacol. i. p. 148, t. 21, f. 5.

Figure 40 represents the type. Hidalgo believes *lais* to be a variety of *puella*.

Var. SUBPUELLA Pilsbry. Pl. 24, figs. 26, 19, 20, 21, 24.

Thinner than *puella*; multilineate with pale yellow on a white ground-color, the periphery encircled by a dark chestnut band which continues up the spire, forming a narrow border above the suture to the apex.

Basilan, Philippines (P. Acad coll.) *Tukan Bessi Id.* (Pfr.)

H. lais var. PFR. in Novit. Conch. iv, p. 114, t. 126, f. 6, 7.

Many specimens of this variety are before me, showing a remarkably constant color-pattern.

C. IROSINENSIS Hidalgo. Pl. 28, figs. 29, 30.

Imperforate, depressed, about equally convex above and below, the young carinated, adults angulated, the angle gradually disappearing; thin, subpellucid, little shining, smooth; (under a lens seem to be decussated with very subtle, inconspicuous spiral and oblique striæ); unicolored whitish under a pale buffish cuticle; apex obtuse; suture simple; whorls 4, slightly convex, rapidly widening, the last dilated in front, not descending, somewhat turgid at the columella. Aperture trapezoidal; peristome thin or sublabiate, the upper margin simple, basal margin arcuate, slightly reflexed, forming an obtuse angle in the young with the white, flat, sloping columella. Alt. 13, greater diam. 24, lesser 19 mill. (*Hid.*)

Irosin (around the river), Prov. Albay, Luzon, Philippines.

H. irosinensis HID., Journ. de Conchyl. 1887, p. 119, t. 4, f. 6; Obras Malacol. i, p. 26, t. 25, f. 9.

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C. ÆRUGINOSA Pfeiffer. Pl. 26, fig. 6.

Imperforate, globose-depressed, rather thin, striatulate, shining, greenish-white; spire convex, vertex small, obtuse; whorls 4, a little convex, the last not descending, inflated; periphery obsoletely angulated, at the suture banded with rust color; columella sloping, slightly arcuate, subexcavated, white; aperture oblique, wide-lunar; peristome slightly reflexed, margins subconniving, right margin sinuous, basal margin arcuately passing into the columella.

Alt. 18, greater diam. 31, lesser 26 mill. (*Pfr.*)

Is. of Bohol and Panglao, Philippines.

H. æruginosa PFR., P. Z. S. 1854, p. 56; Monogr. iv, p. 215.—REEVE, Conch. Icon., f. 1265.—*Cochlostyla* (*Corasia*) *æruginosa* SEMP., Reis., p. 169.—*H.* (*Corasia*) *æruginosa* HIDALGO, Obras, p. 152, t. 21, f. 3.

Closely allied to *C. eydouxi*, *ægrota*, etc.

C. FILARIS Valenciennes. Pl. 25, figs. 52, 53, 54; Pl. 26, figs. 10, 11, 12.

Imperforate, depressed-globose, convex above and below, obtusely angulated at the periphery; white (covered with a thin deciduous yellowish cuticle) *the lip broadly edged with purplish-brown*, the suture narrowly white-margined; surface shining, obliquely striated earlier whorls seen to be obsoletely, spirally striated under a lens. Whorls 4–4½. Aperture oblique, wide; peristome narrowly expanded, the columella subvertical, flattened, somewhat excavated, its inner edge straight or a little irregular, brown below, becoming white above. Alt. 20, greater diam. 33, lesser 27 mill.

Marinduque; Zamboanga, Mindanao.

H. filaris (VAL. in Paris Mus., *teste* Cuming) PFR. P. Z. S. 1845, p. 38; Monogr. i, p. 262.—HIDALGO, Obras Malacol. i, p. 152, t. 23, f. 1–4.—*H. nympha* PFR. P. Z. S. 1849, p. 129; Monogr. iii, p. 147. —REEVE, Conch. Icon., f. 85.—*? C. broderipi var. fasciata* v. MOLL., Landschn. Fauna Cebu, p. 230.

The periphery is far less acutely angled than in *C. virgo*, and the dark border of the lip is broader. Fig. 52 of pl. 25 represents the typical form. Hidalgo arranges the varietal forms as follows:

Var. 1. (Pl. 24, fig. 31). Periphery of the last whorl rounded. This is the *H. nympha* of Pfeiffer and Reeve.

Var. 2. (Pl. 26, figs. 10, 11, 12). Apical whorls purplish-black; suture usually narrowly margined with brown.

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Var. 3. (Pl. 25, fig. 54). Like the last, but the peripheral angle brown. Hidalgo considers *C. broderipi var. fasciata* Möll. the same as this variety. It is from the western coast of Zebu.

Var. 4. (Pl. 25, fig. 53). Shell tawny or chestnut, peripheral angle more obtuse, dark banded.

C. EYDOUXI Hidalgo. Pl. 26, figs. 8, 9.

Imperforate, depressed-globose, thin; white with a faint greenish tint, and slightly diaphanous; *above the suture there is a narrow reddish-brown band,* obsolete on the last half-whorl. Surface smooth, shining, obliquely striatulate. Generally no spiral striæ are visible, even on the inner whorls. Spire low, convex, apex plane; whorls 4, the last very obtusely subangular at the periphery, not descending in front. Aperture oblique, wide; lip white, narrowly expanded; columella flattened, adnate.

Alt. 21, greater diam. 31, lesser 36 mill.

Capul, Philippines.

H. valenciennesii PFR. in Conchyl. Cab., p. 309, t. 53, f. 1, 2; Monogr. i, p. 262.—REEVE, Conch. Icon., f. 87.—DELESSERT, Recueil, t. 38, f. 8, (not *H. valenciennii* EYDOUX, Mag. de Zool. 1838, plate 115, f. 2!)—*H. eydouxi* HIDALGO, Journ. de Conchyl. 1887, p. 115; Obras Malacol. i, pp. 25, 152, t. 22, f. 4.

Distinguished by the narrow brown margin above the suture of the whorls of the spire, the entire shell otherwise being white.

The true *H. valenciennii* of Eydoux is no doubt a *cromyodes* deprived of epidermis, as Hidalgo states.

C. BRODERIPI Pfeiffer. Pl. 24, figs. 27, 28, 32, 33.

Imperforate, depressed-globose, more or less obviously angular at the periphery, thin, very finely striated, subtranslucent, somewhat shining, whitish. Spire little raised, with the apex flat or often a trifle impressed. Whorls 4, flattened, rapidly widening, the last not descending in front, rather swollen beneath. Aperture oblique, broadly lunar; columella very little curved, slightly sloping, somewhat excavated, deeply inserted above; peristome simple, narrowly expanded, a little thickened toward the columella, and reflexed.

Alt. 20, greater diam. 29, lesser 24 mill.

Philippines.

H. broderipi PFR. in Conchyl. Cab. ii, p. 27, t. 68, f. 6, 7, (not *H. broderipi* Rve.)

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The above description, mainly taken from Pfeiffer, corresponds well with the specimens before me, two of which are figured on my plate.

The surface is almost devoid of spiral striæ; the shell is entirely white, fresh specimens having a very delicate greenish tint, scarcely perceptible. It is smaller and less solid than *C. ægrota*, and the peripheral angle is more obvious; to *C. eydouxi* it is very closely allied, but it lacks the constant sutural brown line characteristic of that species.

C. ÆGROTA Reeve. Pl. 26, fig. 1.

Imperforate, depressed-globose, smooth, white or of a very delicate greenish tint; surface shining very delicately striatulate, showing slight traces of subobsolete spiral lines on the earlier whorls. Spire low, convex, apex plane; whorls 4½, the last very obtusely subangular at the periphery; aperture oblique, wide; peristome white, narrowly reflexed, the columellar margin dilated and adnate; columella nearly vertical, its inner edge straight, forming a slight angle with the basal lip at their junction.

Alt. 23½, greater diam. 37, lesser 29 mill.

Mindoro; Badajos, Tablas; Tuburan, Zebu.

H. ægrotus Rv., Conch. Icon., f. 95.—*H. ægrota* PFR., Conchyl. Cab., p. 437, t. 152, f. 3; Monogr. iii, p. 191.—*H.* (*Corasia*) *ægrota* HIDALGO, Obras Malacol. i, p. 152, t. 21, f. 8.—*Cochlostyla* (*Corasia*) *ægrota* v. MOLL., Landschn. Fauna Cebu, p. 230 (a variety.)

The yellowish-green tint of this shell is so delicate as to be scarcely perceptible. The apex and lip are pure white. It is more solid and stronger than *C. eydouxi* or *C. virgo* and its immediate allies. The angulation of the periphery is scarcely sufficiently marked to be noticeable.

C. SAMBOANGA Hombron & Jacquinot. Pl. 26, fig. 13, 14, 15.

Imperforate, subdepressed, thin, delicately striate, moderately shining, waxen-white with two reddish-brown zones, one at periphery, the other at the suture; the suture opaque, white, irregularly subcrenulated. Whorls 4, convex, depressed above, the last moderately inflated; columella obliquely descending, flattened, acute, white; aperture rounded-rhombic; peristome obtuse, straight, white.

Alt. 20, greater diam. 30, lesser 24 mill. (*v. Mart.*)

Islands of Zamboanga; Zebu; Magtan; Mindanao; Basilan; Lampinigan; Candaraman; Balabac; Philippines.

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H. samboanga H. & J. Voy. Pol Sud v, p. 15, t. 5, f. 18–20.—Pfr. Mon. Hel. Viv. iv, p. 215.—*Cochlostyla zamboangæ* v. Mart., Ostas. Zool. ii, p. 89.—*H.* (*Corasia*) *zamboangæ* Hidalgo, Obras. Malacol. p. 151, t. 22, f. 2, 3.—*Cochlostyla* (*Corasia*) *Magtanensis* Semper, Archip. Phil. Landmoll. iii, p. 170, t. 10, f. 11.—v. Moll. Landschn. Fauna Cebu, p. 231, with var. *nana* and *globosa*.

More depressed than *C. intorta*, and with less expanded peristome. The following are considered varieties by Hidalgo.

The *C. magtanensis* of Semper, (pl. 28, figs. 27, 28) is a small form from the island of *Magtan*. It is not separable from the typical *samboanga*, being identical in coloring.

Var. *intaminata* Gould, (pl. 27, fig. 1) is entirely white, very thin, and visibly angulated at the periphery. It is from the island of Mangsi, straits of Balabac.

C. intorta Sowbery. Pl. 28, figs. 16–24.

Imperforate, globose-depressed, thin, rounded at the periphery; typically light straw-colored with peripheral, basal and sutural bands of chestnut brown; (see below). Surface smooth, having light growth-lines, and on the earlier whorls spiral striæ are visible under a lens. Apex flattened, polished, white, brown, pink or purple. Suture linear, margined by a white line. Whorls 4–4¼, the last very little descending. Aperture broad, rounded-lunar, oblique; entire lip narrowly expanded, varying from flesh-tinted to dark brown. Columella oblique, nearly straight above, arcuate below, somewhat flattened and excavated.

Alt. 21, greater diam. 32 mill.

Alt. 24, greater diam. 32 mill.

Alt. 17, greater diam. 26 mill.

Islands of Tablas, Panay, Guimaras, Negros, Zebu, Siquijor, Bohol, Capul and Mindanao, Philippines.

H. intorta Sowerby, P. Z. S. 1840, p. 168.—Reeve, Conch. Syst. ii, t. 164, f. 10; Conch. Icon., t. 20.—Pfr., Symbolæ ii, p. 31; Conchyl. Cab., p. 311, t. 53, f. 8–11; Monogr. i, p. 262.—Delessert, Rec., t. 38, f. 7.—*Cochlostyla* (*Corasia*) *intorta* Semper, Reisen, p. 170.—v. Moll. Landschn. Fauna Cebu, p. 231 (with varieties).—*H.* (*Corasia*) *intorta* Hidalgo, Obras Malacol i, p. 149, t. 22, f. 5–9.

The form and elevation of the spire vary in this beautiful species, as the measurements and figures show. Specimens having an obtuse peripheral carina also occur. The principal color-forms are as follows:

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1. Ground color yellowish, bands three, distinct, not spreading on the latter part of the whorl.

2. Ground color yellowish, no bands.

3. Ground color light-brown below, whitish above, bands three, dark-chestnut.

4. Chestnut colored, with darker bands; apex purple.

5. Delicate light-greenish, with a subsutural and a peripheral purple-brown band, the bands spreading over the entire whorl on its latter portion.

6. Delicate greenish-white, peripheral and sutural bands present, but narrow.

v. Möllendorff describes the following varieties:

1. var. *tenuis* v. Möll. Thin shelled, with a narrow brown sutural band, a wider brown peripheral band, and a narrow vertical brown streak behind the blackish-brown lip, to which the spiral bands extend.

Mt. Mangilao.

2. Var. *expansilabris* v. Möll. Spire more depressed; shell white, shining, the periphery distinctly angulated, without peripheral band; sutural band evanescent; lip more expanded, upper margin at first horizontal, then well curved.

Mts. Uling and Licos, Zebu.

This is the *Cochlostyla* (*Corasia*) *virgo var. subglobosa* of v. Möll., Mal. Bl. (N. F.) x, p. 161.

3. Var. *crassa* v. Möll. Shell smaller than the type, more solid, spire more depressed; whorls 4 (not 4½); white under the deciduous epidermis, with narrow sutural and broad peripheral bands, widening and confluent toward the aperture; peristome thickened, little expanded, white; aperture brown inside.

Medellin, Northen Zebu.

4. Var. *siquijorica* v. Möll. See pl. 28, figs. 19, 20, 21, 22. This is the same as the fifth color-form described above.

C. LIMANSAUENSIS Semper. Pl. 28, figs. 25, 26.

Imperforate, globose or globose-depressed, papery, very diaphanous, whitish or cinnamon colored, having a brown band at the periphery; suture usually margined with rufous in the earlier whorls; whorls 4, the upper depressed, last very convex, inflated beneath; columella whitish, nearly straight; aperture nearly triangular; peristome simple, rufous within, scarcely inflexed.

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Alt. 26–28, greater diam. 34–38, lesser 27–30 mill. (*Semper.*)

Island of Limansaua, between Leyte and Mindanao.

C. (*Corasia*) *limansauensis* SEMP., Reis. Phil. Arch. Landmoll. iii, p. 171, t. 9, f. 6.—*H.* (*Corasia*) *limansauensis* HIDALGO, Obras, i, p. 149, t. 21, f. 7.

Very closely allied to *C. intorta*, but thin as paper, lacking completely a basal brown tract, having an almost vertical columella, and of larger size. Like all other Cochlostylas it lives upon trees near the beach, the leaves of which it twists into a bag for the reception of its eggs. It is the only species of *Cochlostyla* found by Semper on the island Limansaua. Hidalgo doubts its distinctness from *C. intorta*.

* * *

C. BOURDILLONII Theobald. Pl. 33, fig. 55.

Shell conoid, covered-perforate, carinated, thin, polished, whitish, translucent; ornamented under the deciduous, pale straw-colored cuticle with very fine flexuous spiral lines. Whorls 4½, rapidly increasing, a little convex toward the mamillate apex, but the last whorl flat above, and a little inflated around the umbilicus. Aperture large, subquadrate; margins simple, joined by a very thin callus. Alt. 14·8, gr. diam. 25·4, lesser 19·5 mill.; apert. alt. 16, width 14 mill. (*Theob.*)

Prov. Travancore, India.

Corasia bourdillonii THEOB., Journ. Asiat. Soc. Beng. XLV, (pt. ii) p. 185, t. 14, f. 3 (1876).

Judging from the sharp lip, as well as the locality, this is no *Corasia*. It may prove to be a *Nanina*. In the absence of certain information it may as well remain where first described for the present.

Section III. PFEIFFERIA Gray, 1853.

Pfeifferia GRAY, P. Z. S. 1853, p. 110. Type *H. micans* Pfr.—SEMPER, Phil. Archip. p. 225.

Shell globose, imperforate, the slender axis solid, thin, brittle, white, with few whorls; aperture lunar, lip thin, acute, fragile; columella slightly thickened, vertical, deeply inserted in the base.

Animal like *Cochlostyla*, but the mantle reflexed over the acute edge of the shell.

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C. MICANS Pfeiffer. Pl. 19, figs. 12, 13, 14.

Shell imperforate, subglobular, thin, brittle; translucent-whitish, with an opaque white margin below the suture. Surface shining, obliquely striatulate, obsoletely, finely spirally striated. Whorls 4, the last globose, not descending in front. Aperture a little oblique, lunar; *peristome thin, fragile and acute*, the upper margin curving forward; columella vertical, slightly sinuous, deeply inserted in the base. Alt. 22, greater diam. 26, lesser 22 mill.

Province of Cagayan, Northern Luzon, Philippines.

H. micans PFR., P. Z. S. 1845, p. 71; Conchyl. Cab. p. 227, t. 28, f. 3–5; Monogr. i, p. 24.—REEVE, Conch. Icon. f. 46a.—*Pfeifferia micans* GRAY, P. Z. S. 1853, p. 110.—*Cochlostyla micans* SEMPER, Reis. Archip. Phil. Landmoll. p. 225.

The thin fragile lip of this species separates it at once from all other forms of *Cochlostyla*.

Semper describes the animal of this interesting species as follows: The border of the mantle-edge all around, in the contracted specimens, covers about 1–2 mm. of the shell. On the left there is a small mantle-lappet, but none on the right.

The foot is broad, flat, without mucus-gland and without middle area to the sole.

The color of the mantle in the region of the lung is greenish; the foot and mantle-margin are yellowish.

The right tentacle passes with its retractor muscle, between the branches of the genitalia, an exception to the rule in Cochlostyla. The genitalia are just as in Cochlostyla. The receptaculum seminis has a long duct, without diverticulum. The dart-sac is globular, thick; and on the base of the short globule (or mucus) gland there is a small sac, apparently a gland. The vas deferens is wide, and passes gradually into the simple penis, which lacks all accessory glands; the retractor penis is short and thick.

The jaw has numerous (about 8) pretty wide and close ribs, projecting on the cutting edge.

The radula is entirely typical of Cochlostyla; the central tooth has a broad cusp; there are fourteen or fifteen side-teeth or true laterals; already the eighteenth tooth being distinctly tricuspid. In all there are 101 teeth in each transverse row.

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SECOND SERIES: PULMONATA.

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MANUAL

OF

CONCHOLOGY

STRUCTURAL AND SYSTEMATIC.

WITH ILLUSTRATIONS OF THE SPECIES.

BY GEORGE W. TRYON, JR.

CONTINUATION BY

H. A. PILSBRY,

CONSERVATOR OF THE CONCHOLOGICAL SECTION OF THE ACADEMY NATURAL SCIENCES OF PHILADELPHIA.

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Section IV. LEYTIA Pilsbry.

Imperforate, globose, thin; whorls few (4), the last angulated at the periphery. Aperture very large, lip simple, a little expanded below; columella simple, thin, vertical, deeply inserted. Surface spirally striate, having hydrophanous, cream-white bands.

This section differs from *Calocochlea* in its thin, bubble-like shell, composed of few whorls; from *Corasia* in the possession of hydrophanous cuticle, and the globose contour. The anatomy has not been investigated.

C. FRAGILIS Sowerby. Pl. 29, figs. 5, 6.

Imperforate, globose, thin; light blue-green above the periphery, becoming pinkish-white on the spire, the last whorl having numerous narrow interrupted white bands; below the periphery dark green, with two broad straw-colored zones and numerous narrow, broken, whitish lines; lighter around the center of the base. Surface finely spirally striated, obliquely striatulate. Whorls 4, the apex minute, obtuse, brown; last whorl angulated, not descending in front. Aperture large, oblique; peristome white.

Alt. 21, greater diam. 26, lesser 22½ mill.

Tanauan, Island of Leyte, Philippines.

H. fragilis SOWB., P. Z. S. 1841, p. 40.—*H.* (*Corasia*) *fragilis*, HID., Obras. i, p. 149, t. 24, f. 8, 9.—*H. leytensis* PFR., Symbolæ iii, p. 71; Conchyl. Cab. t. 42, f. 7, 8; Monogr. i, p. 242.—RVE., Conch. Icon. f. 55.—CROSSE, Journ de Conchyl, xxiii, p. 134, t. 6, f. 3. 1875.

A bubble-like species, rare in collections. It has an unfinished aspect, even when quite mature.

Section V. CALOCOCHLEA Hartmann, 1840.

Calocochlea HARTM., Erd u. Süsswasser Gasteropoden der Schweiz, etc., p. 163. Type *C. pulcherrima* Sowb., *l. c.*, pl. 54.—*Callicochlias* AGASSIZ, Nomencl. Zool., 1847.—ALBERS, Die Hel. p. 105, *et al.*

Imperforate, solid shells, varying from globose to depressed-globose or lens-shaped and carinated. Generally covered with hydrophanous cuticle, variously patterned. Anatomy as in *Cochlostyla* generally.

Under *Calocochlea* must be placed *Axina* and a number of other groups which stand too close to one another to be separated as primary divisions of *Cochlostyla*, although they have a certain systematic value.

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As subsections of *Calocochlea*, therefore, we may range the following groups:

Subsection 1. CALOCOCHLEA Hartm., 1840.

Subglobose or globose-depressed, the periphery rounded. Surface with oblique light growth-lines, and on the whorls of the spire, fine spirals, often subobsolete; hydrophanous cuticle generally present. Type, *C. pulcherrima.*

Subsection 2. AXINA Albers, 1850.

Varying from globose-turbinate to carinated and lens-shaped; solid, dark-colored; hydrophanous cuticle present. Surface totally lacking spiral striæ. Type, *C. zebuensis.*

Subsection 3. TRACHYSTYLA Pilsbry.

Solid, globose-depressed, dark colored, with a thin ashen hydrophanous cuticle; surface rough and lusterless. Whorls few. Type, *C. cryptica.*

Subsection 1. CALOCOCHLEA Hartm.

Includes Semper's "3 *Gruppe, Calliocochlias* Ag." and "4 *Gruppe, Cochlostylæ hypomelaniæ* Mts."

(1.) *Group of C. cromyodes.*

Globose or globose depressed shells, *thin* rather than solid, yellow or reddish, not conspicuously marked with hydrophanous cuticle, and frequently lacking it entirely.

These shells connect the *C. intorta* group of *Corasia* with *Calocochlea.* The dividing line is extremely difficult to locate, but still there is some difference, as these shells have a wider lip, and generally have more or less hydrophanous cuticle,—characters not found in *Corasia.*

C. CROMYODES Pfeiffer. Pl. 29, figs. 13, 14, 15, 16.

Imperforate, rather thin, depressed-globose. Surface microscopically spirally striate, having light growth-lines. Color varying from greenish-yellow to reddish-brown, *the upper whorls purple,* edged with darker purple. Hydrophanous cuticle either absent or forming bands at suture and periphery, with narrower intervening bands or lines.

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Whorls 4½; suture shallow; apex very obtuse; last whorl but little descending. Aperture oblique, white or tinted inside; lip reflexed, white, *edged with dark brown;* columella oblique.

Alt. 27, diam. 35 mill.

Alt. 21, diam. 28 mill.

Province of Misamis, northern Mindanao.

H. cromyodes PFR., P. Z. S. 1842, p. 150; Monogr. i, p. 261; Conchyl. Cab. t. 53, f. 6, 7.—RVE., Conch. Icon. f. 1429.—*Cochlostyla cromyodes* SEMPER, Reis. p. 171.—*H. valenciennii* EYDOUX, Mag. de Zool. 1838, t. 115, f. 2, a dead shell, denuded of cuticle. (Not *H. valenciennesii* Pfr.; see *Corasia eydouxi* Hidalgo, this volume p. 123.)

Rather thin, and generally unicolored except for the darker spire. Some specimens show a faint peripheral dark band, and rarely a dark band is developed around the columella. Numerous narrow hydrophanous bands are seen on some specimens.

C. DENTICULATA Jay. Pl. 52, figs. 17, 18, 19.

Imperforate, depressed-globose, decidedly *solid.* Surface smooth the growth lines inconspicuous. Color a light brown tint, the spire white, *having a dark brown margin above the suture.*

Spire very low, apical whorl plane. Suture superficial. Whorls 4, the last wide, slightly descending and then ascending in front. Aperture oblique, white within; lip rather thick, reflexed, *edged with dark brown.* Columella very oblique, wide, white, *ending below in a stout tooth.* Alt. 25, greater diam. 34, lesser 29 mill.

Habitat unknown.

H. denticulata JAY, Catalogue (edit. of 1839), p. 114, t. 1, f. 21. —PFR., Monogr. i, 311.

The above description and the figures are from Jay's type specimen, kindly loaned by Prof. R. P. Whitfield, of the American Museum of Natural History, New York City.

The shell is decidedly solid; the columella is wide, its face gently convex, its base strongly toothed, much as in *C. curta* Sowerby. The cuticle is wholly worn from the specimen, but under the very thin parietal callus it is seen to be of the yellow color of that of *C. cromyodes,* a species also resembling *denticulata* very closely in contour, in the suprasutural margination of the spire whorls, in the appearance of the surface, and the dark-edged lip. From *C. cromyodes,* the present species differs only in being more solid, in the

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wider, heavier and toothed columella, and the wider, thicker lip. These characters compel me to regard *denticulata* as a distinct species, even though but one specimen of it is known to me.

C. ALBAIENSIS Sowerby. Pl. 52, figs. 20, 21.

Imperforate, depressed-globose, shining, white, unicolored or brown-banded; spire depressed, suture linear; whorls 4, nearly flat, the last inflated beneath; columella thin, nearly straight, sloping, profoundly excavated. Aperture lunate-oval, upper margin subdepressed; peristome widely expanded, white, the margin subthickened, forming a distinct angle with the base. (*Pfr.*)

Alt. 26, diam. 39 mill.

Palanan to Camiguin de Luzon, E. coast of N. Luzon, and Amberbuk, Province of La Isabella, Luzon.

H. albaiensis SOWB., P. Z. S., 1840, p. 100.—PFR., Monogr. i, p. 260; Conchyl. Cab. p. p, 215, t. 108, f. 1, 2.—REEVE, Conch. Icon. t. 13. f. 48.—*Cochlostyla albaiensis* SEMPER, Reis., p. 176, t. 8, f. 7; t. 18, f. 14 (anatomy).

C. TUKANENSIS Pfeiffer. Pl. 29, figs. 7, 8, 9, 12.

Imperforate, subglobose, thin; surface smooth, the spiral and incremental striæ almost obsolete. White or *rosy* under a thin yellowish or reddish cuticle, sometimes having a dark band at periphery and another at suture; hydrophanous cuticle generally absent, but sometimes forming a few bands.

Spire moderately elevated, apex very obtuse; whorls 4½, convex, the last not perceptibly descending in front. Aperture large, pink or white within; peristome thin, pink or white, *broadly expanding;* columella oblique, flattened, *thin,* nearly straight.

Alt. 29, diam. 31 mill.

Tukan Bessi Id. (Pfr.); Pular Is. (Horn).

H. tukanensis PFR., Mal. Bl. xviii, p. 122, 1871; Novit. Conch. iv, p. 72, t. 121. f. 5–9; Monogr. vii, p. 324.

A more elevated and thinner shell than *C. cromyodes.* Part of the specimens before me are yellow instead of reddish, and some are very small, alt. 17, diam. 23 mill.

C. OBTUSA Pfeiffer. Pl. 35, figs. 23, 24.

Imperforate, subglobose, thin, subdecussated with growth-lines and impressed obsolete concentric lines, shining, chestnut. Spire subelevated, obtuse. Whorls 4, convex, the last inflated. Colu-

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mella oblique, acute, white. Aperture dilated, subauriform, with a pearly luster inside; peristome simple, expanded. Alt. 26, diam. 35 mill. (*Pfr.*)

Luzon, Philippines. (Cuming.)

H. obtusa PFR., P. Z. S. 1845, p. 38; Monogr. i, p. 253; Conchyl. Cab. p. 437, t. 152, f. 1, 2.—REEVE, Conch. Icon. f. 49.

C. AMICTA Reeve. Pl. 34, figs. 7, 8.

Imperforate, subturbinate, semiglobose, smooth, white, covered with an oily buffish epidermis; spire conoid, a little obtuse; whorls 4½, a little convex, the last not descending, subdepressed, about equaling the spire; base rather flattened; columella subvertical, lightly arcuate, white. Aperture oblique, subtrapezoidal-lunar, white inside; peristome white, somewhat thickened, narrowly expanded. Alt. 19, greater diam. 30, lesser 26 mill. (*Pfr.*)

Philippines.

H. amicta RVE., Conch. Icon. f. 52.—PFR., Monogr. iii, p. 173; Conchyl. Cab. p. 442, t. 152, f. 17, 18.

C. DECORA Adams & Reeve. Pl. 52. figs. 23, 24.

Imperforate, conic-semi-globose, solid, nearly smooth, little shining, straw-colored, irregularly variegated with darker streaks. Spire conoid, apex obtuse, pale. Whorls 4, little convex, the last subcarinated, not descending in front: base smooth. Aperture oblique, obsoletely quadrangular, white within; peristome simple, a little expanded, columellar margin flat, dilated. Alt. 18, greater diam. 26 mill. (*Pfr.*)

Mindoro, Philippines.

H. decora AD. & RV., Voy. Samarang, Zool., Moll., p. 62, t. 16, f. 7.—PFR., Monogr. iii, p. 178; Conchyl. Cab. p. 401, t. 144, f. 18, 19.—REEVE, Conch. Icon. f. 586.

(2.) *Group of C. pulcherrima.*

C. PULCHERRIMA Sowerby. Pl. 33, figs. 60–64.

Imperforate, globose, somewhat depressed, generally solid; *ground-color uniform*, varying from buff or cream-color to a dark chestnut-maroon; sometimes unicolored, apparently without any hydrophanous markings whatever, but generally encircled by numerous white or creamy bands which are *closely articulated or broken into dots and spots.*

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The surface is nearly smooth. Whorls 5, the last one scarcely or slightly deflexed in front. Aperture white within, rounded-lunar; peristome reflexed throughout, white, often edged with flesh-color. Columella deeply entering, gently arcuate.

Alt. 31, diam. 35 mill. (average specimen).

Alt. 31, diam. 43 mill. (large thin specimen from Luzon; mouth deep pink within).

Alt. 26, diam. 31 mill. (small buff specimen).

H. pulcherrima SOWB., P. Z. S. 1840, p. 90.—REEVE, Conch. Syst. ii, t. 164. f. 12, 13; Conch. Icon. f. 26.—PFR., Monogr. i, p. 250; Conchyl. Cab. t. 45, f. 1–4.—DELESSERT, Rec. de Coq. t. 38, f. 11, 12, 15, 16.—*Calocochlea pulcherrima* HARTM., Gastr. Schweiz, i, p. 163, f. 54.—*Cochlostyla pulcherrima* Semper, Reis., p. 174, t. 13, f. 9; t. 18, f. 16 (anatomy).—HIDALGO, Journ. Conch. 1887, p. 126.—*H. festiva* MORCH, not Donovan.

The ground-color is extremely variable, every shade between light buff or light olive-green and deep maroon being represented. It is nearly uniform in tint, becoming pink on the earlier whorls in most specimens. In about one-third of the specimens before me there is a narrow dark band bordering the columella, generally not very distinct. In any of the color-forms, from light to dark, bands of close spots of hydrophanous cuticle are frequently developed. The supraperipheral hydrophanous band is the most constant and prominent.

C. FESTIVA Donovan. Pl. 52, fig. 25; pl. 35, figs. 11–16.

Imperforate, globose, somewhat depressed, the spire generally rather conoidal; solid; ground-color (beneath the hydrophanous cuticle) dark reddish-chestnut, sometimes yellowish-chestnut, usually *with a light peripheral girdle.* Covered with a cream-colored or light brown cuticle, with a white zone at periphery.

The hydrophanous cuticle is often closely streaked obliquely, and generally has some or many spiral dark lines. The apical whorls are pink or purple-pink. Whorls 4¼–5, convex. Aperture wide-lunar, pink or white inside; peristome broadly reflexed, typically bright pink, but often white, with or without a pink edge. Columella pink or white, broad, irregularly arcuate.

Alt. 29, diam. 35 mill.

Alt. 38, diam. 44 mill.

Province of Cagayan, Luzon, Philippines.

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H. festiva DONOVAN, Naturalist's Repository iii, pl. 103 (Feb., 1825).—PFR., Monogr. iii, p. 187; Conchyl. Cab. t. 139, f. 19, 20. —RVE., Conch. Icon. f. 107.—*H. luzonica* SOWB. (in sched. Cuming), PFR., Monogr. i, p. 252; Conchyl. Cab. t. 45, f. 7, 9, 10, 11.—RVE., f. 41.—SEMPER, Reis., t. 8, f. 1.—*H. annæ* O. SEMPER, Journ. de Conch. 1862, p. 146, t. 5, f. 8, 9.—*Cochlostyla festiva* SEMP., Reis. p. 176.—HIDALGO, Journ. de Conchyl. 1887, p. 127.

Fig. 25 of pl. 52 is the typical *festiva*. On pl. 35, figs. 11, 12 represent the *C. annæ* Semper; the figures 13–16 are the form *luzonica* Sow.

This species has less variegated cuticle than *C. pulcherrima* and the white equatorial zone is conspicuous. The lip is heavier than in *pulcherrima*; its face is typically pink, but many specimens have a pure white lip and columella.

C. DUBIOSA Pfeiffer. Pl. 32, figs. 52, 54.

Imperforate, globose-depressed, rather thin but solid. Ground-color under the hydrophanous cuticle, varying from yellow to brown, and having *two dark chestnut zones*, one above, the other below the periphery. Covered with a cream-white hydrophanous cuticle, which is *cut into a great number of very fine lines by fine close darker spiral lines.*

The surface is finely spirally striated. Whorls 4½, the last a little descending in front. Aperture rounded, white and showing the zones within; lip broadly reflexed, *thin*, white; columella nearly straight, white, forming an obtuse angle at its base with the lower lip.

Alt. 30, diam. 31 mill.

Mts. of Morong district, Luzon.

H. dubiosa PFR., Symbolæ iii, p, 71; Conchyl. Cab. t. 46, f. 5, 6; Monogr. i, p. 252.—RVE., Conch. Icon. f. 22.—*H. decipiens* var. DELESSERT, Req. de Coq. t. 38, f. 10.—*Cochlostyla dubiosa* HIDALGO, Journ. de Conch. 1887, p. 145.—*H. batanica* RVE., Conch. Icon. t. 9, f. 2.—*H. volubilis* RV. Errata to Conch. Icon.—*Cochlostyla batanica* HIDALGO, Journ. de Conchyl. 1887, p. 129.—*H. speciosa* JAY, Catal. (2nd edit.), plate iii, f. 9, 9 (1836).

The most prominent feature of this species is its thin, broadly expanded lip, yellow-brown ground-color two-banded with chestnut, and the excessively fine and numerous lines of hydrophanous cuticle of the exterior.

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Hidalgo believes the *H. batanica* (+ *volubilis*) of Reeve to be a distinct species. I am unable, with the material before me, to make the separation, but still it may exist. Reeve's figure of *batanica* is copied on my plate 32, fig. 53.

I have examined the type of *Helix speciosa* Jay, now in the American Museum of Natural History, Central Park, New York City. It is a typical *C. dubiosa*. The name *speciosa* has priority over *dubiosa*, but as Jay's description and figure have been demonstrated to be utterly inadequate by the failure of Pfeiffer and others to identify the species correctly, its rehabilitation as a specific name would be obviously contrary to the recognized canons of nomenclature.

C. LALLOENSIS Pfeiffer. Pl. 51, fig. 16; pl. 26, figs. 2, 3.

Imperforate, globose-depressed, rounded at the periphery, thin, bluish-white (denuded of cuticle) *with two dark brown bands*, one above, the other below the periphery; there is also a *narrow brown line* below the suture, ascending the spire.

Whorls 4–4½; apex obtuse, white; last whorl subglobose, a little descending in front; aperture rounded-lunar, oblique, showing the bands within; peristome white, well expanded; columellar margin widened, sloping, slightly arcuate, flattened. Alt. 26, diam. 33 mill.

Lallo, Province of Cagayan, Luzon, Philippines.

H. lalloënsis PFR., P. Z. S. 1855, p. 111; Monogr. iv, p. 214.

The specimen figured on pl. 26 is immature. Numerous specimens are before me, but all are white, as if denuded of cuticle. It seems to be allied to *C. dubiosa*, differing in the possession of a sutural band and the more oblique columella. The surface is very finely roughened and spirally substriated.

C. AUGUSTA Albers. Pl. 35, figs. 17, 18.

Imperforate, depressed-globose, rather solid, spirally closely striated, shining, tawny, ornamented with two wide blackish-chestnut bands with a white space of the same width between them. Spire convex, obtuse; suture white, margined with chestnut; whorls 4, a little convex, the last rounded, slightly descending in front. Aperture oblique, lunate-round, whitish inside, showing pellucid bands; peristome white, expanded; columellar margin oblique, nearly straightly descending, flat, white, subtruncate at base.

Alt. 21, greater diam. 34, lesser 28 mill. (*Pfr.* from spec. in coll. Albers.)

Habitat unknown.

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H. augusta ALB., Mal. Bl. i, 1854, p. 214.—PFR., Mon. iv, p. 214; Novit. Conch. i, p. 41, t. 11, f. 9, 10.

The locality "*New Guinea?*" given by Albers is extremely doubtful.

VAR. On pl. 32, fig. 51, I have figured a specimen which may be a variety of this species, but I am in doubt of it.

C. PRINCEPS Reeve. Pl. 33, figs. 58, 59.

Imperforate, oblong-turbinated, solid, rather swollen, very finely rugulosely striated; yellowish, purple at the apex, covered with a slight hydrophanous epidermis. Aperture lunar-oval; lip thinly reflected, columellar margin appressly tubercled, callous, drawn out. (*Reeve.*)

Philippines Is.

H. princeps RVE., Conch. Icon., f. 1422.—PFR., Monogr. iv, p. 209.

The specimen before me (fig. 59) does not agree in all respects with Reeve's description and his figure (fig. 58). It is thinner, smoother, not so distinctly banded.

C. ERYTHROSPIRA Möllendorff. *Unfigured.*

Imperforate, subglobose, quite thin, above bright violet-red, then chestnut brown-black, covered with a wood-colored hydrophanous cuticle, banded with buff at the periphery; spire semiglobose, apex obtuse, whorls 4½, convex, rather rapidly increasing; suture margined, almost crenulated; finely plicate-striate, the last whorl tumid, base around the columella denuded, shining, blackish. Aperture little oblique, excised-circular; peristome little expanded, a trifle reflexed, thin for this genus, blackish; columella slightly curved, white, much dilated above. (*Möll.*)

Malunu, Prov. Isabela, northern Luzon.

C. (*Callicochlias*) *erythrospira* v. MOLL. Nachr. D. M. Ges. 1890, p. 204.

C. GENERALIS Pfeiffer. Pl. 52, fig. 22.

Imperforate, globose turbinate, striatulate and sculptured with oblique wrinkles especially beneath; not shining; white under a buff-greenish cuticle. Spire convex-conoid, rather obtuse; suture light, submargined. Whorls 4½, a little convex, rapidly increasing, the last little descending in front, encircled above the periphery with a rather wide, flat ridge; base little convex. Columella slightly

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oblique, compressed, excavated, white. Aperture diagonal, obliquely truncate-oval, milk-white inside; peristome thin, margins conniving, the right one scarcely expanded, basal thickened, narrowly reflexed, forming an obtuse angle with the columella.

Alt. 40, diam. 57 mill. (*Pfr.*)

Philippines.

H. generalis PFR., P. Z. S. 1854, p. 123; Novit. Conch. i, p. 2, t. 1, f. 6; Monogr. ii, p. 206.—REEVE, Conch. Icon., f. 1349.

C. CHRYSOCHILA Sowerby. Pl. 34, figs. 9, 10.

Imperforate, globose-subdepressed, solid; surface delicately striate-obliquely, having microscopic spiral lines above, and sometimes obscurely malleated. *Bright greenish-yellow,* the earlier whorls tinged with rufous; *suture edged with a white line; no hydrophanous cuticle;* lip broadly reflexed, *yellow.*

The spire is somewhat conoid, apex very obtuse, whorls nearly 5, the last slightly descending and then ascending in front. Aperture large, white inside; *lip broadly expanded, yellow;* columella thick, yellow, expanding in a concave white callus.

Alt. 39, diam. 43 mill.

Calayan, Philippines.

H. chrysocheila SOWB., P. Z. S. 1841, p. 3.—PFR., Monogr. i, p. 248; Conchyl. Cab., p. 275, t. 44, f. 5, 6.—REEVE, Conch. Syst. ii, p. 163, f. 1; Conch. Icon., f. 25.—*Cochlostyla chrysochila* SEMPER, Reis., p. 175.—HIDALGO, Journal de Conchyl. 1887, p. 125.

A large, smooth yellow species, altogether lacking hydrophanous cuticle, and with a yellow lip.

(3). *Group of C. polillensis.*

C. POLILLENSIS Pfeiffer. Pl. 32, figs. 43–50.

Imperforate, globose-conoid, somewhat solid, nearly smooth; ground-color varying from light-yellow to reddish-chestnut, plain or having 2 to 4 bands; covered with a light brown or creamy hydrophanous cuticle, which generally forms a finely checkered pattern without any conspicuous bands. *Columella having a strong fold near its insertion.*

The contour varies much. Whorls 5½, the last scarcely descending in front. Aperture oblique; lip reflexed and somewhat thick-

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ened, white or flesh-colored; columella subvertical, inserted deeply in the base, and having a strong lobe or fold above.

Alt. 44, diam. 42 mill. (average specimen.)

Island of Polillo off the E. coast of S. Luzon.

H. polillensis PFR., P. Z. S. 1861, p. 190; Novit. Conch., p. 233, t. 60, f. 1, 2; Monogr. v, p. 281.—*H. portei* PFR., P. Z. S. 1861, p. 191; Novit. Conch., t. 60, f. 7–11.—*H. ajax* PFR., P. Z. S. 1861, p. 191; Novit. Conch., t. 60, f. 3.—*H. hector* PFR., P. Z. S. 1861, p. 191.

This is a large, globose-conoid species, with finely checkered cuticle.

Color-var. *polillensis* (typical; figs. 43, 44) has a brownish-yellow ground-color, bandless, or with very faint sutural and columellar bands.

Color-var. *portei* (figs. 47, 50) is very light greenish-yellow, with a distinct band at suture and umbilicus.

Color-var. *ajax* (figs. 45, 46, 48) has a dark reddish-brown ground-color.

Color-var. *hector* (fig. 49) has four dark bands.

Transition forms are not uncommon. The large series before me confirms Pfeiffer's judgment in uniting the several races.

C. ANDROMACHE Pfeiffer. *Unfigured.*

Imperforate, subglobose, rather thin, striatulate, chestnut colored, little shining. Spire convex, apex minute. Whorls 4–4½, moderately convex, the upper white, penultimate tawny, the last globose, not descending, sometimes encircled by light spiral liræ. Columella white, subvertical, compressed. Aperture oblique, lunate-rotund, inside pearly; peristome simple, whitish, everywhere narrowly expanded, margins converging, the right margin flexuous.

Alt. 28, greater diam. 37, lesser 30 mill. (*Pfr.*)

Polillo, Philippines.

H. andromache PFR., P. Z. S. 1861, p. 191; Monogr. v, p. 282.

Probably a variety of *C. polillensis.*

C. PERAFFINIS Pilsbry. Pl. 54, figs. 47, 48.

Imperforate, globose-conoid, *solid*, having low regular wrinkles of growth and on the spire faint spiral striæ. Ground-color *brownish-yellow with inconspicuous darker oblique streaks*, and having *a narrow black-chestnut band at the suture and around the columella.*

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Hydrophanous cuticle disposed in *close narrow bands and lines, closely interrupted by the wrinkles of growth.* Earlier whorls whitish.

Spire convex-subconoid, obtuse; whorls 4¾, the last slowly and slightly descending. Aperture large, oblique, white or nearly so inside; peristome *broadly reflexed*, rather thick, *its face and reverse white.* Columella wide, heavy, oblique, white.

Alt. 38, greater diam. 41, lesser 33 mill.

Alt. 31, greater diam. 32 mill.

Philippines.

This species is allied to *C. polillensis* and *C. codonensis.* It is a distinctly solider shell than the first, with a much broader lip and heavier columella. It is less elevated than *C. codonensis*, with an entirely different color-pattern, the lip not black-edged, the columella not roseate, etc.

C. CODONENSIS Hidalgo. Pl. 53, fig. 37.

Imperforate, subglobose, solid, obsoletely sculptured with wrinkles of growth; shining and tawny, with a black columellar band, under an opaque white more or less interrupted or broadly streaked hydrophanous cuticle.

Spire obtuse, whitish or rosy; whorls 4½ to 5, a little convex, rather rapidly widening, the last large, very convex, obliquely somewhat descending in front; columella long, suboblique, rather flat, *rose colored*, the callus becoming outwardly bluish-white. Aperture ample, oblique, lunate-oval; peristome widely expanded and reflexed; its inner part, with the aperture, whitish-blue, its *outer edge intense black.* (*Hid.*)

Alt. 42, greater diam. 42, lesser 35 mill.

Codon, Island of Catanduanes.

C. codonensis HID., Journ. de Conchyl. 1888, p. 312; *l. c.* 1889, t. 14, f. 4.

This species is allied to *C. polillensis* and its varieties, but the aperture is relatively higher, the columella roseate and straighter, the peristome more reflexed, and black on the outside; the epidermis has a different aspect and the last whorl is more oblique, etc. (*Hid.*)

C. DECIPIENS Sowerby. Pl. 29, figs. 10, 11.

Imperforate, *rather thin*, globose-depressed or subglobose; surface nearly smooth, the growth-lines light, the earlier whorls seen to be spirally striate under a lens. Straw-yellow, with *irregular oblique*

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streaks of white hydrophanous cuticle, and with a peripheral (sometimes also a basal) *interrupted band* of the same, these hydrophanous markings are usually partly lost in adult shells.

Whorls 4½, the last a little descending in front. Aperture large; lip well expanded subreflexed, thin, white; columella arcuate, somewhat sinuous. Alt. 33, diam. 35 mill.

Luzon and Capul, Philippines (Cuming.)

H. decipiens SOWB., P. Z. S. 1840, p. 96.—PFR., Monogr. i, p. 251; Conchyl. Cab., p. 277, t. 45, f. 5, 6.—RVE., f. 23.

A thin species, having oblique ragged streaks and a narrow band of white cuticle. Our specimens are more globose than the figures on pl. 29.

(4). *Group of C. zonifera.*

C. ZONIFERA Sowerby. Pl. 35, figs. 19, 20, 22.

Imperforate, solid, depressed-globose. Ground-color, under the hydrophanous cuticle, *light greenish-buff* with (typically) a *broad peripheral girdle of dark brown*, the upper whorls nearly white. Hydrophanous cuticle cream-white *forming two wide uninterrupted bands, one above the other below the peripheral dark zone;* the base below the lower band has no hydrophanous cuticle; *above the upper band it is present in irregular patches, cut by a group of narrow spiral lines* which revolve about the middle of the upper surface.

Whorls 4–4½, the last wide and slightly descending in front. Aperture quite oblique, white (or flesh-tinted) inside; lip white, roundly reflexed; columella *oblique, straight,* deeply inserted.

Alt. 30, diam. 37 mill.

Leyte; La Laguna, Luzon; Loquilocon, Samar; Visayes; Catanduanes, E. coast of Mindanao; Siargas, in the Strait of Surigao; Philippines.

H. zonifera SOWB., in sched. Cuming.—PFR., Monogr. i, p. 251; Conchyl. Cab., p. 280, t. 46, f. 3, 4.—REEVE, Conch. Icon., t. 9. f. 3.—*Cochlostyla zonifera* MARTENS, Ostas. Landschn., p. 94, with var. *purpurascens* and *modestior.*—*Cochlostyla zonifera* SEMPER, Reis. Phil., p. 177, t. 18, f. 9 (anatomy).—HIDALGO, Journ. de Conchyl. 1887, p. 129.

A globose-depressed species having a broad zone of creamy cuticle on either side of a darker peripheral zone, the upper surface having irregular patches of creamy cuticle cut by a group of spiral lines.

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Var. CIRCE Pfr. Pl. 53, figs. 28, 29.

Ground-color brown, with an ill-defined chocolate band at the periphery, the whorls of the spire and the interior of the aperture purple-tinged. Otherwise like the type.

Is. Samar and Leyte.

H. circe PFR., Monogr. iii, p. 645.—RVE, Conch. Icon., f. 1025.—*Cochlostyla zonifera var. purpurascens* MART., Ostas. Landschn., p. 95.

Another variety is represented on pl. 53, figs. 30, 31. Two broad bands of cream-white cuticle are present as well as traces of a sutural band, but there is a wide white zone above, much as in the following variety, which is, however, a much more globose shell.

Var. PARALEUCA Pilsbry. Pl. 53, figs. 32, 33.

Globose; light-yellow with a broad white band above. Columella wide and strongly curved inward. Alt. 29, diam. 32½ mill.

C. CORONADOI Hidalgo. Pl. 34, figs. 5, 6; pl. 35, fig. 21.

Imperforate, solid, depressed, the spire low-conoidal, ground-color (under the hydrophanous markings), *greenish-yellow, becoming brown on the base;* having (normally) two narrow dark chestnut bands, one below, the other above the periphery and ascending the spire, but the bands are often absent. Hydrophanous cuticle *torn into narrow, oblique shreds,* at least above, *not forming a series of blotches below the suture;* disposed in *two broad zones,* one below, the other above a wide peripheral zone of the ground-color; the upper zone bounded above by a narrow dark band.

Whorls 4½, rather flattened, *the sutures very shallow,* becoming impressed around the last whorl, which descends gradually in front. Aperture quite oblique, white inside; lip broadly reflexed, white; columella deeply entering, more or less *arcuate,* its face deeply excavated. Alt. 31, diam. 44 mill.

Leyte; Catanduanes.

Cochlostyla coronadoi HID., Journ. de Conchyl. 1868, t. 13, f. 5; *l. c.* 1887, p. 132.—*H. cailliaudi var.,* PFR., Conchyl. Cab., t. 42, f. 3, 4 (not *H. cailliaudi* Dh.)

A large, solid species, allied to *C. zonifera,* but larger, with differently shaped columella and differently patterned hydrophanous cuticle.

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Var. PULCHRA Pilsbry. Pl. 54, figs. 43, 44.

Imperforate, globose-depressed, *solid*. Yellowish-brown, slightly streaked obliquely with brown, and having *numerous rather narrow bands of hydrophanous cream-white spots*, a supra-peripheral band sometimes wider. Whorls of the spire having *a narrow brown spiral band*.

Spire convex, obtuse, the earlier two whorls pink, following whorl white. Whorls 5, the last scarcely descending. Aperture large, oblique, white inside; *lip broadly reflexed*, thick, *white on both face and reverse*. Columella arcuate, deeply entering, its face excavated.

Alt. 37, diam. 45 mill.

Albay, Philippines.

A more elevated shell than *C. coronadoi*, with a different pattern of cuticle. A part of the hydrophanous bands are doubtless rubbed off of the specimens before me.

C. NORRISII Sowerby. Pl. 31, figs. 41, 42.

Imperforate, globose-depressed, solid, obsoletely malleated, glabrous, tawny-citrinous, having opaque white zones and under the suture irregular white spots. Spire semiglobose. Whorls 4½, convex, the last excavated at the broad, callous, arcuately prolonged columella. Aperture lunate-subcircular, white inside; peristome thick, very broadly expanded.

Alt. 28, greater diam. 42 mill. (*Pfr.*)

Luzon and Mindanao (Pfr.); *Leyte and Catanduanes* (Hidalgo), *Philippines.*

H. norrisii SOWB. (in sched. Cuming).—PFR., P. Z. S. 1842, p. 85; Monogr. i, p. 250; Conchyl. Cab., t. 46, f. 1, 2.—REEVE, Conch. Icon., f. 21.—*C. norrisii* HID., Journ. de Conchyl. 1887, p. 133.

I have not seen this species. It seems very closly allied to *C. zonifera*, but the lip is perhaps broader and the columella more oblique. Reeve's figure (fig. 42) may not be the same.

C. DAMAHOYI Pfeiffer. Pl. 37, figs. 40, 41, 42.

Imperforate, solid, depressed-globose; having superficial, scarcely obvious spiral lirulæ and on the latter part of the last whorl lightly obliquely malleated. Ground-color rich brown, with *two broad darker zones*, one above, the other below a *wide peripheral zone of greenish-buff*. Hydrophanous cuticle cream-white, strongly contrasting with the dark back-ground, and forming (over this ground-color)

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a wide subsutural and a wide peripheral zone (one or two narrow bands between them), and on the base several wide and narrow bands.

Spire low, inconspicuous; whorls 4½, little convex, the last but little descending in front. Aperture large, banded inside, peristome white, broadly reflexed; columella oblique, wide, nearly straight.

Alt. 33½, diam. 45 mill.

Calayan, Philippines.

H. damahoyi PFR., P. Z. S. 1856, p. 328; Monogr. iv, p. 210; Novit. Conch. iv, p. 8, t. 111, f. 1–4.—*Cochlostyla damahoyi* SEMPER, Reis., p. 175, t. 18, f. 8 (anatomy.)

Allied to *C. zonifera*, but differs markedly in the arrangement of colors and the obscure malleation. The two blackish bands are sometimes absent (fig. 42.)

C. CAILLIAUDI Deshayes. Pl. 50, figs. 2, 3; pl. 52, fig. 26, 27.

Imperforate, solid, large, globose-depressed-conoid. Surface finely and obscurely spirally lirulate, the last whorl quite obviously sculptured with *obliquely forward-descending malleations forming narrow ridges, becoming concentric beneath.* Ground-color *clear greenish-yellow*, having *a dark zone below and another above the periphery.* Hydrophanous white cuticle forming *numerous narrow encircling bands*, mostly worn off in front of the aperture.

Spire rather conoidal; whorls 5, but slightly convex, the suture superficial; last whorl slightly descending in front. Aperture large, white and faintly showing the bands inside; peristome *broadly reflexed*, recurved, white; columella oblique, nearly straight.

Alt. 43, diam. 45 mill.

Camaruan, prov. of Camarines Sur, Luzon (Hidalgo.)

H. cailliaudi DH. in Guérin's Mag. de Zool. 1839, t. 5.—PFR., Monogr. i, p. 246.—REEVE, Conch. Icon., f. 33.—*Cochlostyla cailliaudi* HIDALGO, Journal de Conchyliologie 1887, p. 131.—*Helix ferruginea* LEA, Trans. Amer. Philos. Soc., 2d Ser., vii, p. 464, t. 12, f. 17 (1841.)

A large, solid shell, decidedly malleated, light yellow with two brown bands, the whole covered with numerous narrow, interrupted hydrophanous bands. The typical form is shown in fig. 3, of pl. 50, the specimen figured being nearly denuded of hydrophanous cuticle in front.

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The shell resembles the group of *C. latitans*, *C. cryptica*, etc., in sculpture and shape of the mouth, but it is in coloring and shape of the spire more allied to *C. coronadoi*, etc.

Color-var. *ferruginea* Lea. (pl. 52, fig. 27). Unicolored, brownish. Lea included the true *cailliaudi* also in his diagnosis, but the name may be retained in a restricted sense for the pale reddish-brown form.

Color-var. (pl. 52, fig. 26). Shell smaller, with accessory bands at suture and columella.

C. MICROSPIRA Pfeiffer. Pl. 53, figs. 34, 35, 36.

Imperforate, solid, globose-depressed; surface smooth, with delicate growth-lines, the spiral striation almost or entirely obsolete, the last whorl sometimes slightly malleated. *Yellow, with three dark chestnut or purple bands*, one at the narrowly white-margined suture, one at the periphery, and a third surrounding the columella. *No traces of hydrophanous cuticle.*

Spire short, obtuse; sutures superficial; whorls 4½, the last a little descending in front. Aperture large, white inside and often showing the bands; lip reflexed, white, frequently narrowly edged with brown; columella oblique, white, subtruncate below. Earlier whorls white or reddish.

Alt. 37, diam. 42 mill.

Alt. 35, diam. 49 mill.

Philippines.

H. microspira PFR., P. Z. S. 1853, p. 127; Monogr. iv, p. 213.—REEVE, Conch. Icon., f. 1268.

A large and solid trifasciate species, somewhat allied to *C. zonifera var. circe*, but decidedly heavier, and of a different tone of color. The variations in banding are shown by the figures, selected from a large suite of specimens.

C. HEMISPHÆRION Pfeiffer. Pl. 54, figs. 45, 46.

Imperforate, semiglobose, solid, obliquely striated, and under a lens seen to be very closely spirally sculptured; shining, buff, with chestnut-tawny bands. Spire convex, apex obtuse. Whorls 4½, a little convex, rapidly increasing, the last scarcely descending, the periphery obtusely angled and sometimes irregularly obliquely malleated-plicate; base subplanulated. Aperture oblique, lunate-oval, whitish within; columella somewhat sloping, wide, basal mar-

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gin narrowly reflexed, forming an obtuse angle with the columella. (*Pfr.*) Alt. 27, diam. 43 mill.

Philippines.

H. hemisphærion PFR., Zeitschr. f. Mal. 1851, p. 15; Monogr, iii, p. 186; Conchyl. Cab., p. 407, t. 146, f. 1, 2.

C. SAMARENSIS Semper. Pl. 34, figs. 1, 2; pl. 54, figs. 41, 42.

Imperforate, globose, striatulate, chestnut or tawny, apex very obtuse, usually white, sometimes ornamented with two chestnut bands and an obsolete white band at the periphery. Spire globose; whorls 4, rapidly increasing, the last very large; columella oblique; excavated, white. Aperture lunate-circular, milky or brown; peristome widely reflexed, black-edged. (*S.*)

Alt. 34, greater diam. 46, lesser 35 mill.

Pampan, Samar; San Fernando, Sibuyan.

C. samarensis C. SEMPER, Reis., p. 179, t. 10, f. 9 (shell); t. 13, f. 15; t. 18, f. 12 (anatomy).—HIDALGO, Journ. de Conchyl. 1887, p. 136, t. 6, f. 1, 2.

The typical form is thin, translucent, sometimes with, sometimes without the narrow chestnut bands. A brownish tract surrounds the white columella, and the reflexed peristome is brownish-black. Upon all 3 examples there is a wide whitish and lacerated band at the periphery, formed of the otherwise inconspicuous hydrophanous cuticle. (*S.*)

Hidalgo describes three color-varieties:

1. Shell chestnut, unicolored (pl. 54, fig. 42.)
2. Shell tawny, columellar area and suture brown.
3. Like the last, but periphery with a chestnut band (pl. 54, fig. 41.)

Semper considered the following form a variety, but Hidalgo says that it does not belong to the same species.

Var.? (pl. 34, figs. 3, 4). Shell much thicker; peristome bluish-white; no dark columellar area.

C. COCCOMELOS Sowerby. Pl. 55, figs. 51–55.

Imperforate, globose, rather solid; lightly obliquely striated. Ground color varying from dark chestnut-brown to olive-yellow, generally unicolored, but sometimes banded; *suture white-margined.* Apical whorls pink or purple. Hydrophanous cuticle thin, evanescent, often cut by spiral dark lines.

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Spire low-conoid, very obtuse; whorls 4½, the last slightly descending. Aperture oblique, rounded, white or tinted inside; lip well reflexed, whitish with a brown edge.

Alt. 33, diam. 35 mill.

Alt. 39, diam. 39 mill.

Tablas, Sibuyan and Samar, Philippines.

H. coccomelos SOWB., P. Z. S. 1840, p. 167.—RVE., Conch. Syst. ii, t. 164, f. 9.—*Cochlostyla coccomelos* HIDALGO, Journ. de Conch. 1887, p. 134.—*H. speciosa* PFR., Monogr. i, p. 248; Conchyl. Cab., p. 311, t. 46, f. 7–9, and of authors generally, not *H. speciosa* Jay.

A very variable species. The following varieties are enumerated by Hidalgo:

1. Pale buff, the spire and lip white. An albino form.
2. Olivaceous, 3-banded with chestnut.
3. Olivaceous, columella surrounded by a chestnut zone.
4. Olivaceous, not banded.
5. Greenish, not banded.
6. Tawny, spire paler.
7. Reddish, 3-banded with chestnut.
8. Blackish, spire paler.
9. Chestnut, becoming rosy on the spire (figs. 52, 53.)

Dr. Jay's collection is now in the American Museum of Natural History, Central Park, New York City. I am indebted to Prof. R. P. Whitfield for the opportunity of examining the type of *H. speciosa* Jay, contained therein. It is a *C. dubiosa* (*q. v.*)

C. PONDEROSA Pfeiffer. Pl. 48, fig. 65.

Imperforate, globose-depressed, tumid, solid, ponderous; rather smooth (incremental and concentric striæ very close, scarcely visible); white, the base covered with a shining, pale corneous cuticle. Whorls 4½, a little convex, the last subangulated, sometimes obsoletely marked with a white hydrophanous band below the angle. Columella straight, wide, very oblique. Aperture subauriform, white inside; peristome broadly reflexed.

Alt. 27, greater diam. 46, lesser 34 mill. (*Pfr.*)

Prov. Ilocon, Luzon, Philippines.

H. ponderosa PFR., P. Z. S. 1845, p. 38; Monogr. i, p. 259; Conchyl. Cab., p. 215, t. 108, f. 3, 4.—REEVE, Conch. Icon., f. 47.

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(5). *Group of C. mindanaensis.*

C. MINDANAENSIS Sowerby. Pl. 47, figs. 61, 62.

Imperforate, solid, depressed-globose-conical, large. Surface lightly obliquely striated. *Opaque brownish-yellow*, marked all over with *spots and zigzag streaks of dark reddish-brown*, having a band of hydrophanous whitish cuticle immediately below the periphery.

The spire is low-conoidal, apex very obtuse, the earlier whorls flesh-colored, with a dark line just above the suture. The last whorl is very obtusely subangular at the periphery. Aperture oblique, livid inside; lip reflexed, flesh-colored, darker toward the outer edge; columella flesh-colored, oblique, subtruncated below.

Alt. 44, diam. 53 mill.

Alt. 41, diam. 45 mill.

Is. of Mindanao and Camiguin, Philippines.

H. mindanaënsis SOWB. in sched. Cuming.—PFR., P. Z. S. 1842 p. 85; Monogr. i, p. 245; Conchyl. Cab., p. 268, t. 41, f. 5, 6.—REEVE, Conch. Icon., f. 32.—*H. mindana* RVE., Conch. Syst. ii, t. 164, f. 8.—*Chromocochlea mindorana* HARTM., Gast. Schw. i, p. 139, t. 42.—*Cochlostyla mindanaënsis* SEMPER, Reis., p. 187.

A peculiarly mottled species, very distinct from other known forms.

C. HARFORDII Sowerby. Pl. 55, figs. 49, 50.

Imperforate, depressed-globose-turbinate, large, solid; obliquely lightly striated. Light brown (when worn, light green), blotched irregularly with dark chestnut, having numerous narrow light bands above and, a broad light band, covered with creamy hydrophanous cuticle just below the periphery.

Spire low-conoidal, apex very obtuse; whorls 5, the last a trifle descending in front. Aperture oblique, white within; lip expanded, subreflexed, white. Columella steeply sloping, white.

Alt. 49, diam. 57 mill. (specimen.)

Alt. 48, diam. 70 mill. (Pfr.)

Negros, Philippines.

H. harfordii BROD., P. Z. S. 1840, p. 123.—REEVE, Conch. Syst. ii, t. 165, f. 15; Conch. Icon., f. 36.—PFR., Monogr. i, p. 244; Conchyl. Cab., p. 269, t. 42, f. 1, 2.

Allied to *C. mindanaënsis*, but larger and differently colored.

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(6). *Group of C. melanochila.*

C. PAN Broderip. Pl. 33, figs. 56, 56, 57.

Imperforate, globose-depressed-conoid, solid, smooth, lusterless; ground-color *chocolate-brown below, yellowish-brown above* the periphery; suture narrowly margined with dark brown, covered with a hydrophanous creamy cuticle which is *everywhere* conspicuously *banded* with rust-brown above and chocolate below.

The spire is rather conoidal, apex obtuse; whorls 5¼, the upper nearly flat, the last convex, a little descending in front. Aperture tinted inside, not showing bands; peristome reflexed, more or less conspicuously *dark edged*; columella oblique, nearly straight or obsoletely bisinuate.

Alt. 43, diam. 42 mill. (average size.)

Bohol and Panglao, Philippines.

H. pan BROD., P. Z. S. 1841, p. 23.—REEVE, Conch. Syst., t. 165, f. 19; Conch. Icon., f. 24.—PFR., Monogr. i, p. 245; Conchyl. Cab., p. 265, t. 39, f. 5–7.—DELESSERT, Rec. de Coq., t. 38, f. 9.

The ground-color is much as in *Hadra bipartita.* The hydrophanous cuticle has bands of rust-brown as well as zones of the chocolate ground-color. It is a beautiful shell, exhibiting but little variation.

C. DEPRESSA Semper. Pl. 50. figs. 4, 5, 6, 7, 8.

Imperforate, solid, depressed; surface having light growth-lines and very minute, subobsolete spiral striæ. Ground-color dark brown, having a darker band at the periphery and under the suture. Hydrophanous cuticle forming a *subsutural series of blotches,* a *peripheral zone* and numerous narrow bands on the base, of *cream-white,* the rest of the surface closely lineate with brownish-white cuticle.

The spire is low, rounded; *sutures superficial;* apex obtuse. Whorls 4½, the last obtusely subangular at the periphery, *not in the least descending* in front. Aperture oblique, leaden-bluish inside; lip narrowly expanded and subreflexed, *dark brown;* columella wide, flattened, subtruncate below.

Alt. 28, diam. 40 mill.

Mindanao; Surigao, Philippines.

H. lignaria PFR., P. Z. S. 1846, p. 111; Monogr. i, p. 259; Conchyl. Cab., p. 424, t. 149, f. 15.—REEVE, fig. 40. (not *Bulimus lignarius* PFR., also a *Cochlostyla*).—*Cochlostyla depressa* SEMPER, Reis., p. 180.—HIDALGO, Journ. de Conchyl. 1887, p. 137.

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This species differs from *C. damahoyi* which it somewhat resembles in pattern of coloring, in its constantly brown lip and more depressed contour.

Var. *perdepressa* (figs. 6, 7, 8). Much more depressed above than the type; upper surface (under the hydrophanous patches) greenish-yellow, base dark brown. Dark bands at suture, periphery and and columella. Alt. 25, diam. 42 mill.

C. MELANOCHILA Valenciennes. Pl. 30, figs. 17, 18, 19.

Imperforate, solid, depressed-globose; growth-lines delicate; spiral striæ subobsolete. Dark *chestnut-brown, with a wide yellowish band above, and a narrow one on the base;* apex purple or pink. Hydrophanous cuticle brownish, usually lost by erosion for the greater part.

Spire low, apex very obtuse; whorls 5, the last a little descending in front. Aperture oblique, wide, white inside; lip reflexed, *dark brown;* columella white, nearly straight.

Alt. 31, diam. 44 mill.

Alt. 34, diam. 36 mill.

Calapan, Mindoro, Philippines.

H. melanocheila VAL, in Paris Mus.—GRATELOUP, Actes Soc. Linn. Bord., xi, p. 397, t. 4, f. 12.—PFR., Monogr. i, p. 258; Conchyl. Cab. p. 276, t. 44, f. 9, 10.—REEVE, Conch. Icon. f. 80.—*H. brunnea* SOWB., P. Z. S. 1841, p. 40 (not of Anton).—*Cochlostyla melanocheila* HIDALGO, Journ. de Conchyl. 1887, p. 125.

A large black-lipped species, intermediate between *C. pan* and *C. roissyana.*

C. CHLOROCHROA Sowerby. Pl. 37, figs. 38, 39.

Imperforate, subglobose, rather thin, tawny or pale brown, streaked and marbled with white; covered with an ashen-brown cuticle. Spire semiglobose. Whorls 4½, a little convex, the last obsoletely angular at the periphery. Columella oblique, arcuate, denticulate. Aperture rounded-lunar; peristome subthickened, expanded, brown. Alt. 34, greater diam. 50, lesser 42 mill. (*Pfr.*)

Camiguin de Mindanao (Semper); *Bohol* (Cuming), *Philippines.*

H. chlorochroa SOW., P. Z. S. 1841, p. 2.—PFR., Monogr. i, p. 246; Conchyl. Cab. p. 274, t. 44, f. 1, 2.—REEVE, f. 27.—*Cochlostyla chlorochroa* SEMPER, Reis., p. 187.

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C. MATRUELIS Sowerby. Pl. 48, figs. 70, 71.

Imperforate, depressed-globose, rather thin. Ground-color *brown with three blackish bands:* one below the suture, one at the periphery, the third (occasionally absent) bounding a *light yellow columellar tract;* apex purple. Hydrophanous cuticle very thin, but forming an opaque creamy band at suture and immediately below the periphery.

Spire low, apex very obtuse. Whorls slightly exceeding 4, the *apex slightly sunken;* last whorl descending a little in front. Aperture oblique, livid and showing a band inside; lip rather narrowly expanded, brown; columella very wide, *brown*, truncated and subdentate below, *the tooth white.* Alt. 25, diam. 33 mill.

Mindanao, Philippines.

H. matruelis SOWB. P. Z. S. 1841, p. 24.—PFR., Monogr. i, p. 259; Conchyl. Cab. p. 282, t. 46, f. 10, 11.—REEVE, Conch. Icon. f. 75.—DELESSERT, Rec., t. 38, f. 4.

Somewhat allied to *C. melanocheila* but smaller, the columella of a different form, and the arrangement of colors diverse.

C. DIFFICILIS Pfeiffer. Pl. 48, fig. 72.

Imperforate, globose-depressed, thin, very minutely striated, shining, pale tawny, at the white suture banded with chestnut. Spire small, semiglobose. Whorls 4½, a little convex, the last inflated, at the periphery and base, banded with chestnut; not descending in front. Aperture oblique, tetragonal-lunar, white inside; peristome subthickened, narrowly reflexed, the columellar margin straightened, much dilated, flat, white. Alt. 26, greater diam. 42, lesser 34 mill. (*Pfr.*)

Philippines.

H. difficilis PFR., P. Z. S. 1853, p. 127; Monogr. iv, p. 213.—REEVE, Conch. Icon. f. 1269.

C. ROISSYANA Férussac. Pl. 30, figs. 23–28.

Imperforate, subglobular, solid, compact. Surface lusterless, smooth. Color either *yellow, variously banded with chocolate-brown,* or *chocolate with a light band above;* the inner whorls either white or purplish-blue. The hydrophanous cuticle is thin, light brown, and nearly uniform, but it is usually almost entirely worn off.

The form is globose and compact; growth-lines light; spiral striation nearly obsolete. Color very variable. Whorls 5, the last

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slightly descending in front. Aperture oblique, whitish inside; lip *narrowly expanded, blackish-brown*, rarely white; columella white, wide, short, nearly straight, steeply sloping.

Alt. 31, diam. 32 mill. (average specimen).

Mindoro, Philippines.

H. roissyana FER., Hist. t. 104, f. 2–3.—SOWB., P. Z. S. 1840, p. 101.—PFR., Monogr. i, p. 249; Conchyl. Cab. p. 283, t. 47, f. 1–5; Novit. Conch. iii, p. 497, t. 107, f. 10, 11.—REEVE, Conch. Icon. f. 73.—*Cochlostyla roissyana* SEMP., Reis., p. 185.—HIDALGO, Obras. Malacol. i, t. 51, f. 1–7.—*H. rossiana* GRAY, Ann. of Phil. (n. s.), ix, p. 412.

A compact, subglobular species, with narrow, dark lip. The typical form as figured by Férussac is yellow with dark bands.

Color-var. *lutea* Pfr. (pl. 30, figs. 23, 24). Light yellowish, with a lighter band above.

Color-var. *subatra* (pl. 30, fig. 28). Body-whorl dark chocolate-brown, a light band appearing on the penultimate whorl.

C. INFUSCATA Albers. Pl. 30, figs. 20, 21.

Imperforate, conoid-subglobose, solid, obliquely striated, obsoletely decussated with spiral striæ; tawny; spire convex-conoid, whitish above; suture white-margined. Whorls 5, convex, the last rotund, shortly descending in front, radiated and obsoletely banded with brown; columellar area chestnut. Columella somewhat sloping, wide, white, subexcavated. Aperture oblique, lunate-rounded, milk-white inside; peristome thick, white, narrowly reflexed, the right margin arched forward. (*Pfr.* from spec. in coll. Albers.)

Alt. 24, greater diam. 31, lesser 27 mill.

Habitat supposed to be Philippines.

H. infuscata ALB., Mal. Bl. i, 1854, p. 214.—PFR., Novit. Conch. i, p. 41, t. 11, f. 7, 8; Monogr. iv, p. 211.

C. MAINITENSIS Hidalgo. Pl. 55, fig. 56.

Imperforate, subglobose, rather solid, smooth, chestnut colored, under an ashen-brown hydrophanous cuticle, transversely darker, obscurely lineated, and at the periphery having a white band.

Spire moderate, apex obtuse, pale. Suture simple; whorls 5, a little convex, the last whorl very rotund, somewhat descending in front, half the length of the shell. Aperture rotund-truncate, livid inside; columella oblique, rather wide, depressed-concave, brown,

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the margin whitish. Peristome simple; nearly semicircular, margin somewhat obtuse, chestnut, slightly thickened toward the columella. (*Hid.*) Alt. 42, greater diam. 41, lesser 39 mill.

Mainit, Island of Mindanao.

C. mainitensis HID., Journ. de Conchyl. 1888, p. 310; *l. c.* 1889, t. 14, f. 2.

Under a considerable magnification are seen striæ of growth and transverse striæ, but very indistinct. (*Hid.*)

C. LIGNICOLOR Möllendorff. *Unfigured.*

Imperforate, subdepressed-globose or globose, subtly striated, chestnut-brown, covered with a streaked and lineated wood-colored hydrophanous cuticle, a rather wide tawny-whitish band at the periphery, and sometimes another around the columella; spire globose-conoid, apex flat. Whorls 5, convex, the last tumid, above the aperture denuded and shining. Aperture lunate-rotund; peristome straight, acute, subthickened, brown; columella wide, rose-white, rather straightened, sloping. (*Möll.*)

Alt. 32, greater diam. 44, lesser 38 mill.
Alt. 37, greater diam. 44, lesser 38 mill.
Alt. 35, greater diam. 39, lesser 33 mill.

Mts. on L. Mainit, Mindanao.

C. (*Callicochlias*) *lignicolor* v. MOLL. Nachr. D. M. Ges. July–Aug. 1888, p. 100.

In color and markings it approaches *C. depressa* Semp. and *melanochila* Val. while it is more globular than the last, and in contour resembles most *C. sphærion* Sow. The non-expanded, weakly thickened peristome distinguishes it from all the foregoing, being found only in *C. suprabadia* Semp. The white peripheral band is lacking on none of the ten examples before me, whilst the circumumbilical is present upon four only. The height of the spire varies, as the above dimensions show, not inconsiderably, but the higher forms seem to predominate. (*Möll.*)

Compare *C. mainitensis* Hidalgo.

C. SOLIDA Pfeiffer. Pl. 30, fig. 22.

Imperforate, conoid-semiglobose, thick, striate, tawny, covered with a thin brown lusterless cuticle; spire convex, obtuse, the apex reddish; whorls 5, slightly convex, the last more convex, obsoletely angulated in middle, slightly descending in front. Columella

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straightened, sloping, wide, whitish. Aperture oblique, subtetragonal-lunar, white inside; peristome somewhat thickened, a trifle expanded, brown-edged. (*Pfr.*)

Alt. 27, greater diam. 37, lesser 33 mill.

Naujan, Mindoro.

H. solida PFR., P. Z. S. 1851; Monogr. iii, p. 187.—*H. sphærion* PFR., Conchyl. Cab. t. 42, f. 5, 6 (not description).—REEVE, Conch. Icon. f. 114.

C. SPHÆRION Sowerby. Pl. 31, figs. 34, 35.

Shell globose-orbicular, thin, smooth, unicolored, scarcely shining; spire short, little elevated; whorls 4, ventricose; sculptured with delicate growth-lines only; last whorl large, much larger than the others; suture a distinct white line; aperture rounded, little modified by the last whorl, inside whitish; outer lip brown, a little reflexed in front; columellar lip white, rather widened, deeply inserted. (*Sowb.*) Alt. 1·3, diam. 1·6 inch. (*Sowb.*)

Tanauan, Island of Leyte, Philippines.

H. sphærion SOWB., P. Z. S. 1841, p. 2.—PFR., Conchyl. Cab. t. 150, f. 5, 6 (not *l. c.*, t. 42, f. 5, 6).—*H. intincta* SHUTTLW., Bern. Mittheil., Aug. 1852, p. 196.—*Cochlostyla sphærion* SEMPER, Reis. p. 184.—HIDALGO, Journ. de Conchyl. 1887, p. 127.

I have not seen the typical form of this species. Sowerby's original description is given above. As varieties the following forms have been described.

Var. INTINCTA Shuttlw. Pl. 31, figs. 31, 32, 33.

Buff above, chestnut-brown below the periphery; a dark streak behind the peristome; lip but slightly expanded, brown; columella white, wide, slightly concave, flattened and somewhat excavated. Alt. 30, diam. 32½ mill.

This is the only form of *C. sphærion* I have seen. The coloring and scarcely expanded lip, as well as the rather thin texture, remind one of *C. dimera*. Like that shell, it shows no spiral striæ when examined under a lens. This is the *H. sphærion* of Philippi (Abbild. iii, p. 54, Helix t. 10, f. 2) and of Reeve (Conch. Icon. f. 111a).

VAR. Form as in the last, but unicolored dark brown all over; suture with a light line. Reeve's figure 111b represents this color-pattern.

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VAR. Three-banded with brown, one band at the white suture, one at the periphery, the third around the columella (*Hidalgo.*)

VAR. Shell buff-tawny, the base and three narrow zones brown. Leyte. (*Hidalgo.*)

VAR. Much larger and thicker than specimens from Leyte, the lip much more strongly reflexed, and pure white. Alt. 39, diam. 47 mill.

Island of Panaon, off S. Leyte.

Doubtfully referred to *sphærion.* Described by Semper.

VAR. Another form resembling *v. intincta* was collected by Semper at Higaquit, Tandag, S. Juan de Bislig and Placer, on the east coast of Mindanao.

Var. NANA Semper.

A small form from Maasin and Malitboc, on the southern coast of Leyte. There are 5 principal color-patterns, as follows: (1) Unicolored yellow, no trace of bands; (2) Clear yellow, with a brown line at suture, and gradually becoming brown toward the peristome and beneath; (3) brownish-yellow, beneath dark brown; (4) last whorl unicolored brown-black; (5) black with a light yellow band above. The largest specimen measures: alt. 25, diam. 34 mill.; the smallest specimen, alt. 21, diam. 27 mill.

C. XANTHOBASIS Pilsbry. Pl. 54, figs. 38, 39, 40.

Subglobose, thin but rather strong, obliquely striatulate and sometimes very superficially spirally malleated. *White above, bright straw-yellow beneath.* Suture narrowly *bordered below with yellow.*

Spire convex, less obtuse than in *C. intincta* Shuttlw. Whorls 4½, the earlier nearly flat, with linear non-impressed suture; last whorl somewhat descending and then ascending in front. Peristome entirely *pure white on both face and reverse, broadly expanded;* columella arcuate, thin, its face excavated; outer edge of the columellar callus brown-tinted.

Alt. 33, greater diam. 35, lesser 29 mill.

Alt. 28, greater diam. 34 mill.

Albay, Philippines.

Allied to certain forms of *C. sphærion* in color-pattern, but differing in the broadly expanded lip, etc.

The cuticle is extremely thin above, and is readily lost, leaving that part of the surface chalk-white. When present, it is nearly

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white. The earlier whorls are white. The base is of a glossy bright yellow.

C. DIMERA Jonas. Pl. 30, figs. 29, 30.

Imperforate, globose-elevated, rather thin; surface showing faint growth-lines but no spiral striæ. *Buff above, chocolate-brown below* the periphery, the *suture margined above and below with brown; apical whorl dark purple,* fading into pink on the second and third whorls. Under the thin buff cuticle the upper surface is white.

Spire elevated, apex obtuse. Whorls 5, slightly convex, the last but slightly descending. Aperture half-round, bicolored within; lip *very slightly expanded, dark brown;* columella rather wide, *white.*

Alt. 31, diam. 25½ mill.

Alt. 25½, diam. 24 mill.

Mindoro, Philippines.

H. dimera JONAS, Moll. Beitr., p. 23, t. 11, f. 17.—PFR., Monogr. i, p. 225; Conchyl. Cab. t. 50, f. 3, 4.—REEVE, Conch. Icon. f. 61. —*H. Jonasi var. beta* PFR., P. Z. S. 1845, p. 126 (*teste* Pfr.).—*Cochlostyla dimera* SEMPER, Reis. p. 187.—HIDALGO, Journ. de Conchyl. 1887, p. 141 (with var.).

Hidalgo describes a variety with whitish shell, the apex violaceous, columella surrounded with tawny zone.

C. CROSSEI Hidalgo. Pl. 56, figs. 57, 58.

Imperforate, subglobose-conoid, the apex obtuse; rather solid, opaque, not shining, scarcely striatulate; blackish under an ashen-brown epidermis, which is transversely lineated with brown. Whorls 4 to 4½, convex, the first nude, blue black, the last equaling one-half the total length, the base less convex. Aperture rounded-subquadrangular, blue or blue-brown inside; columella oblique, subdilated, white; peristome black, slightly reflexed.

Alt. 26, greater diam. 28, lesser 25 mill. (*Hid.*)

Agcalatao, near Badajos, Tablas.

* *C. Crossei* HID., Journ. de Conchyl. 1887, p. 141, t. 5, f. 4.

This species presents analogies with *C. dimera, glaucopthalma, libata* and *carbonaria.* It is distinguished from the first by its coloration, its cuticle, and its more ventricose form; from the second by its general form and epidermis; from the third by its coloration and

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peristome; finally from the last named species by its coloration, columella, and the non-angular periphery. (*Hid.*)

This species, with the two following, forms a passage to the globose forms of the section *Axina*.

C. RETUSA Pfeiffer. Pl. 56, figs. 59, 60.

Imperforate, subglobose, the apex retuse; thin, smooth, the base concentrically striolate; chestnut-tawny, broadly flamed and streaked with white; partly covered with a hydrophanous white, deciduous cuticle, pallid above, chestnut-banded. Spire short. Whorls 4, a little convex, the last subangular, scarcely descending; columella entering, white, dentate-dilated above. Aperture rounded-lunar, pearly within; peristome broadly expanded, a little reflexed.

Alt. 20, greater diam. 28, lesser 24 mill. (*Pfr.*)

Samar, Philippines.

H. retusa PFR., P. Z. S. 1845, p. 132; Monogr. i, p. 255; Conchyl. Cab., t. 47, f. 9, 10.—PHILIPPI, Abbild. ii, p. 84, t. 7, f. 2.—REEVE, f. 82.

C. LIBATA Reeve. Pl. 56, figs. 61, 62, 63.

Imperforate, subglobose, solid, nearly smooth; epidermis brown, covered with darker spiral lines. Spire semiglobose, apex obtuse, nude, brown. Whorls 4½, a little convex, the last rounded, not much wider than the preceding volution; base denuded, buff; columellar area chestnut; columella subvertical, flat, white. Aperture oblique, subtetragonal-lunar, white within; peristome brownish, narrowly expanded, right margin bowed.

Alt. 24, greater diam. 29, lesser 25 mill. (*Pfr.*)

Benguet and Mancayan, N.-W. Luzon.

H. libata RVE., Conch. Icon., f. 35.—PFR., Monogr. iii, p. 189; Conchyl. Cab., p. 438, t. 152, f. 7, 8.—*Cochlostyla libata* SEMPER, Reis., p. 186.—HIDALGO, Journ. de Conchyl. 1887, p. 147.

Hidalgo notices these color-varieties:

1. Like the type, but lip whitish, and the blackish columellar band absent.

2. Buff, ornamented with two very broad chestnut bands; suture and columellar area black, apex violaceous.

3. Tawny, last whorl unifasciate in the middle; suture and columellar area black, apex violaceous, (fig. 61.)

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Subsection 2. Axina Albers, 1850.

Axina Alb., Die Hel., p. 113.—v. Mart., Die Hel. 1861, p. 71 (type *H. zebuensis*).—Pfeiffer, Nomencl. Hel. Viv. p. 199, 1878. —Semper, Landmoll. Phil. 190.—v. Moll., Landschn. Cebu. p. 234.—*Carocolla* of some early authors.

Imperforate shells, varying from globose turbinate to flattened carinated and lens-shaped; *solid, dark colored*; more or less *covered with a hydrophanous cuticle;* the surface smooth or at least *totally lacking spiral sculpture;* whorls 4½–6; lip either narrow or broadly reflexed.

Anatomy as in *Cochlostyla* generally. The group seems to replace *Calocochlea*, on the islands Siquijor and Zebu.

Key to species of Axina.

A. Peripheral keel very acute
  b. Lip broad, flat, angled and somewhat guttered at the keel,
    c. Whorl deflexed at aperture; diam. about 70 mill., *garibaldiana*.
    cc. Whorl not deflexed at aperture; diam. about 40 mill., *siquijorensis*.
  bb. Lip narrow, its face not flattened,
    c. Shell about equally convex above and below the keel,
      d. Surface smooth, obliquely streaked above, *zebuensis*.
      dd. Surface densely, finely lamellose, not variegated above, *striatissima*.
    cc. Shell flattened below, elevated above the keel *carbonaria*.
AA. Peripheral keel rather obtuse, or periphery rounded
  b. Lip broadly reflexed; columella distinctly toothed at base,
    c. Periphery obtusely keeled; whorl deflexed at aperture *pfeifferi*.
  bb. Lip rather narrowly reflexed
    c. Alt. exceeding the lesser diameter of the shell; columella broad, milk-white; periphery rounded or very indistinctly angled.
      d. Cuticle obliquely streaked; alt. 24, diam. 25 mill., *bruguieriana*.
      dd. Cuticle scarcely streaked; alt. 27–29, diam. 28–29 mill. *montfortiana*.
    cc. Alt. less than the lesser diam. of shell; columella pink or brown tinted.

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d. Depressed; alt. about one-half the diam.; periphery rounded, *phloiodes.*

dd. Rather elevated; decidedly angled at periphery, flattened below, *carbonaria.*

ddd. Not very obviously angled at periphery,

e. Whorls narrowly revolving, aperture narrow; base very convex *magistra.*

ee. Whorls more rapidly increasing; aperture wide, base rather flattened *moreleti.*

C. GARIBALDIANA Dohrn & Semper. Pl. 20, figs. 1, 2.

Lenticular, solid, sculptured with growth-striæ; chestnut, spotted and figured all over with straw-color, marked with interrupted darker concentric lines; acutely and compressly carinated, carina subexserted on the whorls above; spire moderately elevated, apex depressed; whorls 5, scarcely convex, depressed at the suture, the last whorl descending in front, more convex beneath; aperture ax-shaped, bluish inside; peristome thickened, expanded, reflexed, fleshy-violet, the right margin angular, somewhat channelled at the angle; columellar margin dilated, planate, very oblique.

Alt. 27, greater diam. 72, lesser 64 mill.

Northern Luzon.

Cochlostyla (*Axina*) *garibaldiana* D. & S., Mal. Bl. ix, 1862, p. 206.—*Helix garibaldiana* PFR., Novit. Conch. p. 219, t. 58, f. 1, 2; Monogr. v. p. 206.

G. SIQUIJORENSIS Broderip. Pl. 20, figs. 8, 9, 10.

Imperforate, solid, depressed and very acutely keeled; convex above and below; reddish-brown, the earlier whorls purple, dark brown or whitish; body-whorl not descending in front; lip broad, reflexed.

The surface is smooth, often slightly malleated above the acute, knife-like keel, and usually obliquely malleated below it; growth-striæ light. The hydrophanous epidermis is generally entirely rubbed off, but often persists near the keel and behind the lip. Whorls 5, flattened, the last not descending in front. Aperture oblique, fleshy-white inside; lip broadly reflexed on its outer and

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basal margins, angled at the carina, brown in color. Columella not toothed.

Alt. 19, greater diam. 39, lesser 33 mill.

Alt. 22, greater diam. 43, lesser 37 mill.

San Juan, etc., Island of Siquijor, Philippines.

Carocolla siquijorensis BROD., P. Z. S. 1841, p. 38.—*Helix siquijorensis* PFR,. Monogr. i, p. 295; Conch. Cab. p. 29, t. 69, f. 1, 2, 3, 4.—RVE., Conch. Icon. f. 119.—HIDALGO, Obras, i, p. 143, t. 12, f. 2. 3.

Keel more acute and lip broader than in the allied *C. zebuensis*, which further differs in having the whorl deflexed in front. There is some variation in height of spire and in color.

Var. *pallens* v. Möll. Shell smaller, often higher, buff. (v. Möll., Jahr. D. M. Ges. 1891, p. 46. Vide Küster, pl. 69, f. 3, 4.)

C. SCHADENBERGI Möllendorff. *Unfigured.*

Imperforate, angulate-globose, carinated, solid, bright chestnut, the hydrophanous cuticle yellowish-white, arranged in a series of bands of spots; spire convex-conoid, apex obtuse, paler. Whorls 5½, nearly flat, slowly increasing, separated by rather impressed sutures, transversely striated, microscopically granulose, the last impressed under the rather thick exserted carina, then a little convex, in front suddenly and deeply deflexed, in adults malleated. Aperture very oblique, ax-shaped; peristome rather broadly expanded, reflexed, thickened, white lipped, outwardly brown, upper margin sinuous, outer margin subcanaliculate in the middle; columella wide, somewhat straightened, obliquely descending, forming an obtuse angle with the basal margin, surrounded by a wide callus. (*Moll.*)

Alt. 39, diam. 59 mill.; aperture width with callus, 39, alt. 32 mill.

District of Quiangan, province Nueva Vizcaya, central Luzon.

C. (*Axina*) *schadenbergi* v. MOLL., Nachr. D. M. Ges. 1890, p. 205.

C. KOBELTI Möllendorff. *Unfigured.*

Imperforate, depressed-globose, angulate, solid, somewhat shining, olive-buff, brown at the suture, ornamented with bands of whitish hydrophanous cuticle, regularly interrupted at the suture. Spire depressed convex, apex obtuse, nearly planate. Whorls 5, slowly

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increasing, a little convex, separated by little impressed suture, lightly striated, decussated by almost microscopic spiral lines, sculptured with obliquely forward descending wrinkles; last whorl nearly flat on the base, malleate-rugose, in front shortly but distinctly deflexed. Aperture oblique, rotund pentagonal; peristome broadly expanded, a little reflexed, callous labiate, reddish-brown, the upper margin sigmoidly sinuate, the outer chanelled in the middle; columella short, obliquely descending, outwardly plicate, base nodiformly thickened. (*Moll.*)

Alt. 32, diam. 48 mill.; apert., width with callus 32, alt. 25 mill.

Mt. Limutan, dist. Morong, Luzon.

C. (*Axina*) *Kobelti* v. MOLL., Nachr. D. M. Ges. 1890, p. 205.

C. ZEBUENSIS Broderip. Pl. 20, figs. 3, 4, 5, 6.

Imperforate, depressed, solid, acutely carinated, about equally convex above and below the carina. Covered with a buff cuticle, becoming reddish on the body-whorl, and either continuous above, with dark spots at the carina (fig. 3), or conspicuously streaked (figs. 5, 6); the base more or less cut by spiral dark and light lines. Apical whorls purple or livid reddish-brown. *Surface smooth.*

The surface is quite smooth, even in perfectly fresh examples. Whorls 4½, nearly flat, the last descending more or less below the carina in front. Aperture oblique, bluish-white inside; peristome dark brown, obtuse, narrowly expanded above, angled at the keel, narrowly reflexed beneath. Columella obliquely sloping, nearly straight, more or less obviously toothed below.

Alt. 19, greater diam. 36, lesser 30½ mill.

Alt. 16, greater diam. 29, lesser 25½ mill.

Western Zebu.

Carocolla zebuensis BROD. (in part), P. Z. S. 1841, p. 46.—RVE., Conch. Syst. ii, t. 168, f. 14, 16.—*H. zebuensis* PFR., Monogr. i, p. 296; Conchyl. Cab. t. 68, f. 12, 13, 14, 15.—HIDALGO, Obras, i, p. 143, t. 11, f. 4, 5.—*Cochlostyla* (*Axina*) *zebuensis* SEMP., Landschn. Phil. p. 191.—MLLDFF., Landschn. Cebu, p. 234.

Broderip and authors having included two species under the name *zebuensis*, it becomes necessary to select one for the type. The published figures all represent the variegated form with smooth epidermis, and that may, therefore, retain the name *zebuensis*.

The range of variation is considerable in size as well as in coloring. Figs. 5, 6 of plate 20 represents the largest specimen I have seen.

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C. STRIATISSIMA Pilsbry. Pl. 57, figs. 73, 74, 75; pl. 20, fig. 7.

Imperforate, depressed, solid, acutely carinated, about equally convex above and below the keel. Covered with a brown cuticle which is finely and regularly *raised into narrow lamellæ* in the direction of growth-lines, the intervals between the lamellæ being microscopically obliquely wrinkled. Unicolored above, except that the earlier whorls are denuded of cuticle and dark purplish; the base having usually numerous darker concentric lines.

The surface is lusterless, *densely lamellose*, the cuticular folds being close and acute. The upper surface has neither oblique streaks nor spiral lines. Whorls 4¼, nearly flat, the last slightly or considerably descending in front. Aperture oblique, livid-whitish inside; peristome blackish-brown, narrowly expanded above, angled at the periphery, narrowly reflexed below; columella sloping, not toothed.

Alt. 18, greater diam. 33, lesser 30 mill.

Zebu, Philippines.

H. (*Carocolla*) *zebuensis, var. e. tota fusca,* BROD., P. Z. S. 1841, p. 46.

This form differs from *C. zebuensis* in being unicolored above, and having densely lamellose cuticle.

C. PFEIFFERI Semper. Pl. 44, figs. 34, 35, 36, 37.

Imperforate, depressed or depressed-turbinate, bluntly angled at the periphery, more convex above than below the angle; dark brown, having a whitish-buff hydrophanous epidermis, radiating from the suture above, and cut by spiral dark lines, forming a wide band just below the peripheral angle, and cut into interrupted narrow concentric bands on the base.

Surface smooth, lightly striatulate. Whorls 4¾, somewhat convex, the last descending in front. Aperture oblique, livid-whitish within; peristome brown, rather broadly expanded and reflexed; columella sloping, abruptly truncated or toothed below.

Alt. 22, greater diam. 33, lesser 28 mill.

Alt. 26, greater diam. 31, lesser 28 mill.

Dalaguete, western Zebu, Philippines.

H. cuming PFR., P. Z. S. 1842, p. 88; Monogr. i, p. 264; Conchyl. Cab. t. 70, f. 3, 4.—PHIL., Abbild. i, p. 69, t. 3, f. 4.—REEVE, Conch. Icon. f. 51.—HIDALGO, Obras, i, pp. 144, t. 11, f. 6, 7.—(Not *Bulimus cumingi* Pfr., also a *Cochlostyla.*)—*Cochlostyla* (*Axina*)

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Pfeifferi SEMPER, Landmoll. Phil. p. 191.—v. MOLL., Landschn. Cebu, p. 236.

Closely allied to *C. magistra* Pfr., *C. gloynei* Sowb., but less globose, with more oblique aperture and wider lip. The base is not excavated around the axis as it is in *magistra*, and the whorls of the spire do not revolve nearly so closely.

C. PHLOIODES Pfeiffer. Pl. 40, figs. 8, 9.

Imperforate, depressed, solid; shining blackish-red under the papery epidermis which is varied with darker streaks; spire subplanulate; suture profound; whorls 4½, convex; columella nearly straight, very oblique, subexcavated. Aperture wide-lunar, livid inside, shining; peristome thickened, reflexed, brown. (*Pfr.*)

Alt. 17½, greater diam. 29, lesser 25 mill.

Zebu, Philippines.

H. phloiodes PFR., P. Z. S. 1842, p. 151; Conchyl. Cab. p. 427, t. 150, f. 3, 4; Monogr. i, p. 265.—RVE., Conch. Icon. f. 55.—HIDALGO, Obras, i, p. 146.—*Cochlostyla* (*Axina*) *phloiodes* MOLL., Landschn. Cebu, p. 236.

C. CARBONARIA Sowerby. Pl. 43, figs. 30, 31, 32; pl. 44, fig. 33.

Imperforate, solid, *low-trochiform*, varying from *subangular to carinated* at the periphery, *decidedly flattened below the angle*, very convex above it. Very dark brown, covered with a light brown hydrophanous cuticle, usually obliquely streaked dark and light above, the base streaked radially with blackish and light, and usually spirally lineolate.

The surface is lightly wrinkled by growth lines; the hydrophanous streaks are brownish, less conspicuously contrasting with the dark streaks than in most species. The apical whorls are dark purple or rosy. The lateral outlines of the spire are quite convex. Whorls 5½, slightly convex, the last not descending in front. Aperture oblique, pinkish-plumbeous within; *peristome very narrowly expanded*, deep brown; the columella nearly vertical, dilated, not toothed, *pinkish-brown* or whitish.

Alt. 26, greater diam. 29, lesser 27 mill.

Alt. 22, greater diam. 27½. lesser 25½ mill.

Negros; Boljoon and Sambuan, Zebu, Philippines.

H. carbonaria (SOWB., in sched.) PFR., P. Z. S. 1842, p. 86; Conchyl. Cab. p. 285, t. 47, f. 6–8; Monogr. i, p. 296.—REEVE,

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Conch. Icon. f. 63.—HIDALGO, Obras, i, p. 145, t. 12, f. 6, 7.—*Cochlostyla* (*Axina*) *carbonaria* SEMPER, Reis., p. 191.—v. MOLL., Landschn. Cebu, p. 237.

Among typical examples, at Alegria and Malabuyoc, are found some of a handsome red color, with fiery-red peristome, which v. Möllendorff proposes to call deviation *rubens*.

C. MAGISTRA Pfeiffer. Pl. 41, figs. 17, 18, 19; pl. 57, fig. 76; pl. 21, figs. 37, 38.

Imperforate, solid, subglobose-depressed, the periphery very obtusely angled. Blackish-brown obliquely streaked and spirally lineolate with buff-white hydrophanous cuticle above, having a broad white band just below the periphery, the base having many concentric whitish lines and some radiating streaks.

The surface is smooth, lightly striatulate. There is a row of dark and light blotches along the suture, as in *C. pfeifferi*. Whorls 5½, convex, closely coiled, the last a very little descending in front. Aperture whitish-leaden within; lip reflexed, blackish-brown; columella white, deeply inserted, its edge slightly convex, not toothed at base. Alt. 22½, greater diam. 29½, lesser 26 mill.

Medellin, northern Zebu; Islands of Magtan and Timobo near Leyte.

H. magistra PFR., Zeitschr. f. Mal. 1852, p. 91; Conchyl. Cab. p. 486, t. 159, f. 38–40; Monogr. iii, p. 178.—HIDALGO, Obras, i, p. 145, t. xi, f. 3.—*H. magister* REEVE, Conch. Icon. f. 1018.—*Cochlostyla* (*Axina*) *magistra* v. MOLL., Landschn. Cebu, p. 239 (with var. *ecarinata*).—*Cochlostyla* (*Axina*) *gloynei* SOWB., Journ. Linn. Soc. Lond. xx, p. 398, t. 25, f. 16, 17 (1889).—*H.* (*Axina*) *gloynei* HIDALGO, Obras, i, p. 144, t. 11, f. 1, 2.

This species was originally described from specimens denuded of their hydrophanous cuticle. The original figures, copied on my pl. 41, figs. 17–19, represent them in this condition. A more satisfactory illustration is pl. 57, fig. 76.

From *C. pfeifferi* it is constantly and readily distinguished by the more narrowly revolving whorls seen from above, and the more swollen base, which is far more excavated at the axis than in *C. pfeifferi*.

The following varietal forms have received names:

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Var. *gloynei* Sowb. (1889). Pl. 21, figs. 37, 38.

More globose, elegantly fenestrated with cream-white; periphery very obtusely carinated. Apical whorls rose.

Var. *ecarinata* v. Möll. (1890).

Nearly 6 little-convex whorls, the last not angulated; cuticle latticed with white, apex rose, right margin of the aperture not in the least angulated, peristome less expanded and reflexed.

Alt. 22½, diam. 32½ mill.

Magtan; Timobo.

C. MORELETI Pfeiffer. Pl. 45, figs. 45, 46.

Imperforate, conoid-globose, rather solid; brown-black, covered with a shining buff-chestnut cuticle, variously striped and zigzagly streaked. Spire sub-semi-globose, apex roseate, rather acute. Whorls 4½, little convex, separated by somewhat impressed sutures, the last whorl large, peculiarly flattened at the periphery, toward the base angulated, beneath somewhat flattened. Aperture very oblique, roundly-quadrangular, milk-white inside; peristome black, narrowly reflexed; columella straighened, suboblique, flesh-colored, whitish above. (*v. Möll.*)

Alt. 28, greater diam. 37 mill.; apert. width 25½, alt. 21½ mill.

Boljoon, Zebu.

A. moreleti PFR., Zeitschr. f. Mal., 1848, p. 118; Conchyl. Cab. p. 330, t. 130, f. 9, 10; Monogr. iii, p. 177.—*Cochlostyla* (*Axina*) *moreleti* v. MOLL., Landschn. Cebu, p. 238.

The only published figures represent a shell from which the epidermis had been rubbed. Möllendorff has recently described fresh examples and discovered the locality, heretofore unknown.

C. MONTFORTIANA Pfeiffer. Pl. 41, figs. 14, 15, 16.

Imperforate, turbinate, thick, ponderous, blackish-rufous, covered with a hydrophanous ashen-brown cuticle; spire conoid; apex violet-purple, denuded, shining, obtuse; whorls 4½, slightly convex, the last angulated, angle evanescent on the latter part of the whorl; columella sloping, callous, white, subdentate at base; aperture subtetragonal, shining white within; peristome narrowly reflexed, bordered with blackish-brown. (*Pfr.*)

Alt. 22, greater diam. 31, lesser 27 mill.

Philippine Is.

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H. montfortiana PFR., P. Z. S. 1846, p. 38; Monogr. i, p. 224.—REEVE, Conch. Icon. f. 76.

The specimens before me, one of which is figured on pl. 41, are not "*ponderosa*," nor is the aperture "*intus alba*." Otherwise they correspond with Pfeiffer's diagnosis, translated above. They differ from C. *bruguieriana* in being larger, somewhat more turbinate in contour, the hydrophanous cuticle not streaked, the columella subdentate below, and the apex purple. These distinctions may prove to be variable when more shells are examined.

C. BRUGUIERIANA Pfeiffer. Pl. 40, figs. 6, 7; pl. 57, figs. 77, 78.

Imperforate, *globose-turbinate*, rather thin but solid, rounded at the periphery. Covered with a hydrophanous cuticle light brown in color, obliquely streaked with cream-white; the apical whorls pink, with a darker band along the suture.

Surface smooth; cuticle removed around the columella and in front of the mouth, exposing the dark brown ground-color. Whorls 5, somewhat convex, the last not descending in front, or but slightly, rounded at the periphery, or more rarely very obtusely subangular, convex beneath. Aperture wide semi-lunar, purplish-pink inside; lip very narrowly expanded, blackish-brown; columella dilated, deeply inserted, *snow-white*, brown at the base.

Alt. 24, greater diam. 25, lesser 22 mill.

Philippines.

H. bruguieriana PFR., P. Z. S. 1845, p. 44; Conchyl. Cab. p. 299, t. 44, f. 3, 4; Monogr. i, p. 224.—REEVE, Conch. Icon. f. 38.

More elevated than the other forms of *Axina*, and usually quite rounded at the periphery. It is very difficult to draw the line between *Axina bruguieriana* and *Calocochlea roissyana*, etc., but still, what little difference there is seems to be in favor of placing *bruguieriana* in the present group.

The preceding species is doubtfully distinct, but differs in being larger, with less streaked cuticle and purple apex.

Subsection 3. TRACHYSTYLA Pilsbry.

These are the *Cochlostylæ cinereæ* of Semper. The shell is solid, *dark colored*, with a *dull ashen hydrophanous cuticle*. The spire is short, *whorls few and rapidly widening*, columella oblique, straight; *surface dull and roughened.*

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The species live on the ground under leaves, etc., contrary to the usual arboreal station of *Cochlostyla*.

C. CRYPTICA Broderip. Pl. 50, fig. 1; pl. 51, fig. 9.

Imperforate, capacious, solid, depressed-globose. Surface sculptured with low spiral cords, and *close, obliquely forward-descending wrinkles*. Dark brown, covered with a thin brownish hydrophanous cuticle, which is worn from the prominences of the surface.

Spire short, the first 1½ whorls planorboid; suture impressed. Whorls 4½, convex, rapidly widening, the last somewhat descending in front. Aperture large, oblique, livid inside; peristome flesh-colored, reflexed. Columella wide, very oblique, curving inward in the middle. Alt. 46, diam. 56 mill.

Northern Samar; Eastern Mindanao, Philippines.

H. cryptica BROD., P. Z. S. 1841, p. 22.—PFR., Monogr. i, p. 258; Conchyl. Cab. p. 272, t. 43, f. 1, 2.—REEVE, Conch. Icon. f. 7.—*Cochlostyla cryptica* SEMPER, *l. c.* p. 189.

I am unable to separate as species the *cryptica, latitans* and *cretata* of Broderip, and have therefore considered the two latter geographic races.

Var. LATITANS Sowerby. Pl. 51, figs. 10, 11.

Imperforate, capacious, solid, depressed-globose; surface rudely roughened by low spiral cords, and subobsoletely obliquely malleated. Dark brown, more or less covered with a creamy-ashen hydrophanous cuticle, which is absent for a distance above the periphery, and in front of the mouth.

Spire low, very obtuse; whorls 4, the last but slightly descending in front. Aperture very large, oblique, livid-pink inside; lip reflexed, flesh-colored; columella broad, very oblique, nearly straight, whitish. Alt. 50, diam. 60 mill.

Forests of Sierra Bullones, on the north coast of Bohol; Dapa, Siargao, Pta Malimono, near Surigao, Mindanao, Philippines.

H. latitans BROD., P. Z. S. 1841, p. 23.—REEVE, Conch. Syst. ii, t. 165, f. 18; Conch. Icon., f. 10.—PFR., Monogr. i, p. 257; Conchyl. Cab., p. 273, t. 43, f. 3, 4.—DELESS., Rec., t. 38, f. 3.—DH. in Fér., Hist., t. 108A, f. 1, 2.—*Cochlostyla latitans* SEMPER, Reis., p. 188, t. 18, f. 15 (anatomy).—? *H. dionacea* DH., in Fér., Hist., t. 28A, f. 11, 12, texte, p. 276.—PFR., Monogr. iii, p. 191.

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Differs from *C. cryptica* in the absence or obsolescence of oblique wrinkles, and in the broad band just above the periphery, denuded of hydrophanous cuticle.

Var. CRETATA Broderip. Pl. 51, fig. 12.

Shell subglobose, swollen; whorls 3, the last much the largest, and begirt with blackish bands and lines; closely striated with oblique growth-lines, and encircled with elevated spiral lines; brownish-black, with a chalky cuticle; aperture silvery-bluish, the lip having an obscure reddish border. (*Brod.*)

Tananuan, Is. of Leyte, Philippines.

H. cretata BROD., P. Z. S. 1841, p. 23.—PFR., Monogr. i, p. 258. —REEVE, Conch. Icon., f. 13.

Seems to differ mainly in the more conspicuous development of the hydrophanous cuticle.

C. PANAENSIS Semper. *Unfigured.*

Imperforate, turbinate-globose, solid, purple-brown, margined with tawny at the suture; spire elevated, globose; whorls 4, a little convex, encircled by evanescent impressed lines; the last whorl not descending; suture generally impressed; columella very much dilated, excavated, rather sloping, whitish-rosy; aperture ample, subtetragonal, livid; peristome broadly expanded and reflexed, horny-livid, upper margin strongly arched, basal margin forming an angle with the columella. (*S.*) Alt. 50, greater diam. 65, lesser 46 mill.

Panaon, near Surigao.

C. panaensis SEMP., Reis., p. 189.

The very obliquely placed aperture, with the upper lip strongly arched forward, the high, globular form of the shell, the quite impressed, yellow-edged suture, and the comparative smoothness of the shell, with very weakly inclined columella, cause me to regard this as a species. (*S.*)

C. CINERACEA Semper. Pl. 59, fig. 3.

Depressed, solid, rough, and grooved by irregular impressed lines; ashen; obtusely carinated at the periphery; spire shortly conoid; whorls 4½, a little convex, the last one nearly flat above, very convex below, not descending in front. Columella white, nearly straight. Aperture oblique, subtetragonal, livid within; peristome

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narrowly expanded, fleshy-livid; columellar margin forming a right angle with the basal. (*S.*)

Alt. 35–42, greater diam. 70, lesser 55 mill.

Lianga, Mindanao.

C. cineracea C. SEMPER, Reis., p. 190, t. 9, f. 1.

Stands between *C. cryptica* and *C. garibaldiana.*

C. DATAENSIS Semper. Pl. 51, figs. 13, 14, 15.

Imperforate, solid, depressed-globose; *surface roughened by spiral sulci below, and obliquely descending wrinkles above.* Chestnut-brown unicolored, or having a yellow band at the periphery, the lower edge of which is not sharply defined.

Spire low-conoid, apex obtuse. Whorls 4¾, the last slightly descending in front. Aperture wide, fleshy-white within; lip well expanded, subreflexed, flesh-colored; columella wide, not deeply inserted, oblique, truncated below. Alt. 32, diam. 37 mill.

Foot of Mt. Data, near the mines of Mancayan, Western Cordillera of N. Luzon, at 5–6000 ft. alt.

C. *dataensis* O. SEMPER, Journ. de Conchyl. xiv, p. 152, t. 5, f. 1, 1866.—C. SEMPER, Reis., p. 186, t. 8, f. 8, t. 13, f. 17 (anatomy).—*H. dataensis* PFR., Monogr. v, p. 283.

The rudely sculptured surface is very characteristic, and shows this species to be closely allied to the group of *C. cryptica* rather than to the "*Cochlostylæ hypomelaniæ*," where it is grouped by Semper.

Section VI. CHROMATOSPHÆRA Pilsbry.

Gruppe der Cochlostylæ globosæ SEMPER, Reisen, Landmoll., p. 181.

The shell is imperforate, heliciform, depressed-globose solid and opaque, *richly colored, but lacking hydrophanous cuticle;* surface *lacking spiral sculpture;* last whorl *scarcely descending* at the aperture. *Lip blunt,* usually very narrowly reflexed throughout; columella subvertical, *deeply inserted,* the umbilico-columellar area *covered with a concave white callus.* Type, *C. aurata.*

Anatomy as in typical *Cochlostyla.*

A small group of rare shells, confined to northern Luzon. It is impossible to place these species in either *Corasia, Calocochlea* or *Pfeifferia;* they form an independent group allied to these sections and to *Pachysphæra.*

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C. AURATA Sowerby. Pl. 56, figs. 68, 69, 70; pl. 26, figs. 4, 5, 7.

Imperforate, depressed-globose, solid; sulphur-yellow, with a wide orange zone below the suture and (generally) a dark blue line above the periphery; apical whorl purple, the next outer whorl red.

The surface is smooth, lusterless, lightly striatulate. Spire low, apex plane; whorls 4½, convex, the last a trifle descending in front, constricted behind the lip. Aperture slightly oblique, wide-lunar, white inside, showing a black-brown supra-peripheral band wider than that of the outside. Peristome very narrowly reflexed throughout, white; columella arcuate, sinuous and deeply entering above, spreading in a wide, concave white callus, the slightly elevated edge of which bounds the umbilical area.

Alt. 22½, greater diam. 30, lesser 24 mill.

Northern Luzon and Manilla, Philippines.

H. aurata SOWB., P. Z. S. 1840, p. 100.—REEVE, Conch. Syst. t. 166, f. 26; Conch. Icon., f. 46.—PFR., Monogr. i, p. 260; Conchyl. Cab., p. 217, t. 108, f. 13, 14.—HIDALGO, Obras, t, 24, f. 7.

The outer lip is decidedly curved forward above, receding in a peculiar manner at its upper insertion. The colors of this shell are peculiarly pleasing.

Var. Golden above, banded with white at the suture, the base white. (*Pfr.*)

C. ERUBESCENS Semper. Pl. 56, figs. 64, 65.

Imperforate, depressed-globose, thin, shining, lightly striate and irregularly malleated, golden, ornamented with a somewhat interrupted blue band at the suture. Spire little exserted, very obtuse, red; whorls 4, a little convex, the last much inflated, not descending, very obsoletely angulated, coarctate at the margin. Columella straight, flat, white. Aperture wide-lunar, oblique; peristome simple, narrowly reflexed, the upper margin curving forward.

Alt. 25, greater diam. 33, lesser 26 mill. (*S.*)

Cabicungan, prov. of Cagayan, Luzon.

C. erubescens S., Reis. Landmoll. p. 182, t. 9, f. 8; t. 10, f. 12 (var.)

A single example was taken by my servant Antonio at the northern point of Luzon. It stands rather near to *C. aurata*, but differs in the greater height, want of a wide band at periphery, the malleations on the last whorl, and the contraction of the whorl behind the lip. (*S.*)

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Var. LUTEOCINCTA Semper. Pl. 56, figs. 66, 67.

Pure white in color; more globular; not malleated. (*S.*)

Casiguran, N. E. Luzon.

C. LIVIDOCINCTA Semper. Pl. 56, figs. 71, 72.

Imperforate, globose, thin, ornamented with a broad livid band, and another of brown at the suture; spire scarcely exserted, apex obtuse, bluish, ornamented with a white cuticular band. Whorls 4–4½, nearly flat, the last much inflated, not descending; columella subvertical, excavated, white. Aperture little oblique, lunar; peristome simple, scarcely thickened, not reflexed.

Alt. 27, greater diam. 32, lesser 26 mill. (*S.*)

Casiguran, Baler, Mariquit, island of Luzon, very rare.

C. livido-cincta S., Reis. Phil. Landmoll., p. 182, t. 9, f. 9.

Of this remarkable species I have found in all, only two adult and two young specimens. (*S.*)

C. PUDIBUNDA Semper.

Subperforate, conic-globose, thick, white; spire exserted, apex obtuse, red or reddish-golden. Whorls 5, a little convex, the last inflated, not descending. Columella lightly arcuate, vertical, white. Aperture little oblique, rounded-lunar; peristome slightly thickened, not reflexed. Alt. 31, greater diam. 35, lesser 28 mill.

Minanga, Ambubuk and Digollorin, Luzon.

C. pudibunda SEMPER, *l. c.*, p. 183.

Agrees entirely with typical *Cochlostyla* in anatomy. This species has not been figured.

Section VII. HELICOSTYLA Férussac, 1819.

As used here, this section comprises a number of minor groups, too closely allied to be given separate rank as primary sections.

The shells have generally a more elevated contour than those included in *Calocochlea*, and usually they lack hydrophanous cuticle and spiral striæ.

It must freely be admitted that the differences between this group and *Calocochlea* are not definite enough to permit one to frame diagnoses of any practical value. In the arrangement of the species no two authors agree in detail, this diversity of opinion being the natural result of the indiscriminate inosculation of characters shown by the shells themselves.

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In *Helicostyla*, as in *Calocochlea*, there exist a number of minor groups deserving individual discussion. They are as follows:

Subsection 1. PACHYSPHÆRA Pilsbry.

Small, *globular or globose-elevated, solid*, brightly colored; *lacking hydrophanous cuticle* and spiral striæ. Type, *C. sphærica*.

Subsection 2. ORUSTIA Mörch, 1852.

Turbinate-globose, *thin*, brightly colored; *partly covered with hydrophanous cuticle;* no spiral striæ. Lip narrowly reflexed, thin; columella *vertical, not folded, deeply entering*. Type, *C. monticula*.

Subsection 3. COCHLODRYAS Martens, 1860.

Globose-elevated; colors *brilliant green* or brown; *no hydrophanous cuticle;* suture white-margined; surface shining, having faint spiral striæ above. Type, *C. polychroa*.

Subsection 4. HELICOSTYLA s. str.

Globose, globose-conic or oblong; colors not vivid; hydrophanous cuticle sometimes present. Type *C. mirabilis*.

Subsection 1. PACHYSPHÆRA Pilsbry.

Gruppe der Cochlostylæ sphaericæ MARTENS, Ostas. Landschn. p. 97—SEMPER, Reis. Landmoll. p. 197.

A small group of compact, solid little shells, confined to northwestern Luzon.

Key to species.

a. Face of lip dark-edged; shell globose
  b sutural band white; columellar band dark brown; columella white — *sphaerica*.
  bb. sutural and columellar bands green; columella reddish — *balteata*.
aa. Face of lip not dark-edged; shell elevated
  b. Lip distinctly reflexed — *iloconensis*.
  bb. Lip very bluntly reflexed — *annullata*.

C. SPHÆRICA Sowerby. Pl. 39, figs. 82, 83, 84.

Imperforate, very solid, globular; ground-color straw-yellow either uniform or with irregular oblique yellowish-chestnut streaks,

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having a narrow white band below the suture bordered by a bright yellow band, a supra-peripheral chestnut line, and a dark columellar area; the lip edged with dark brown.

The surface is smooth, sometimes slightly malleated. Whorls 4½ to 5, the last deflexed at the aperture and decidedly constricted behind the lip. The aperture is half-round, white inside; lip very strongly thickened within, narrowly reflexed, white, edged with deep brown; columella heavy, white.

Alt. 25, diam. 23½ mill.

Alt. 20, diam. 19 mill.

Alt. 23½, diam. 24 mill.

Ylocos, north-western Luzon.

H. sphærica Sowb., P. Z. S. 1841, p. 26.—Pfr., Monogr. i, p. 225; Conchyl. Cab., t. 39, f. 3, 4.—Rve., f. 104.—*Cochlostyla sphærica* Semper, Phil. Archip., Landmoll., p. 198.

One of the most attractive Helices. Semper says that the brown line at the periphery is wanting in one specimen among 19 examined. I have seen many more than this, but in none of them was it lacking. The dark oblique streaks are rarely so prominent as in fig. 82.

C. balteata Sowerby. Pl. 39, figs. 89, 90, 91, 92, 93.

Imperforate, solid, globose or globose-turbinate; ground-color pale yellow; suture bordered by a grass-green band, sometimes split into two; on the middle of the upper surface there is a wide band of olive or purplish, becoming reddish on the earlier whorls, this band often bordered below by a supra-peripheral line or zone of darker color; columellar tract grass-green. Columella red. Apex pink, rarely white.

The surface is smooth. Whorls 5, the last somewhat deflexed in front, slightly constricted behind the lip. Aperture half round, oblique; lip somewhat thickened within, very narrowly expanded, edged with purple-brown. Columella wide, pinkish or purplish-brown.

Alt. 22, greater diam. 20½ mill.

Alt. 20, greater diam. 19 mill.

Alt. 19, greater diam. 21 mill. (pl. 39, figs. 91, 92.)

Provinces of South and North Ylocos, north-western Luzon.

H. balteata Sowb., P. Z. S. 1840, p. 136.—Pfr., Symb. ii, p. 23; Conchyl. Cab., p. 302, t. 51, f. 9–12; Monogr. i, p. 226.—Rve.,

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Conch. Syst. ii, t. 166, f. 25; Conch. Icon., f. 71.—*Cochlostyla balteata* SEMPER, Reis. Landmoll., p. 197, t. 18, f. 24 (dentition.)

Allied to *C. sphærica*, but the ground-color is paler, the banding mainly green; the lip is narrower and the columella is colored. There is considerable variation in contour, figs. 91, 92 representing the most depressed specimen before me. This example has several grass-green bands on the base. The coloring of this species is notably variable. The principal patterns are figured on pl. 39.

The apical whorls are generally pink; but when they are white, the columella also is light-colored.

C. ANNULATA Sowerby. Pl. 39, figs. 85, 86, 87, 88.

Imperforate, solid, globose-turbinate; ground-color yellow, usually having a broad brown or purple-brown zone at the circumference, a pink line or a yellow band at the suture, and a streak of reddish-brown back of the lip and around the columella. Lip *very little reflexed, very blunt and thick.*

The surface is very lightly striatulate; the banding is very variable, but the ground-color is always yellow. Apex obtuse, buff or pink. Whorls 5, the last a little deflexed in front. Aperture white within, half-round, oblique; lip thickened, flattened, its face usually pink, its reverse red.

Alt. 25, diam. 21 mill.

Alt. 20, diam. 17 mill.

Provinces of South and North Ylocos, Luzon, Philippines.

H. annulata SOWB., P. Z. S. 1840, p. 135.—PFR., Mon. i, p. 227; Conchyl. Cab. p. 302, t. 51, f. 5–8.—REEVE, Conch. Icon. f. 110.—*Cochlostyla annulata* SEMP., Reis. Landmoll. p. 197.

Closely allied to *C. iloconensis*, differing mainly in the much more narrowly reflexed and much more obtuse lip.

The usual form (fig. 88) has a wide peripheral girdle, a subsutural line of pink or band of yellow, and back of the lip there is a broad red-brown streak. Some examples have no color-bands, the suture being bordered with white, the lip streaked as usual (fig. 87). Specimens are also found having no color bands whatever, being of a uniform yellow color; lip white, its reverse without a streak. One such is before me, and Semper mentions another.

This is one of the most abundant snails of South and North Ylocos.

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C. ILOCONENSIS Sowerby. Pl. 39, figs. 97, 98, 99, 100.

Imperforate, solid, high-globose, the altitude decidedly exceeding the diameter. Color varying from light yellow to dark brown or purplish-olive-brown, the lighter forms having two yellow or yellowish-brown bands, or one yellow and one pink band; the darker forms having several lighter bands. Lip rather broadly or very broadly reflexed, of a uniform white or pinkish tint.

The surface is lightly obliquely striatulate; whorls about 5, the last a little descending and then slightly ascending at the aperture. The aperture is oblique, white or pink inside. The lip is generally broadly reflexed, both lip and columella white or light pink. The columella is generally encircled by a pink tract.

Alt. 31, diam. 23 mill.

Alt. 20½, diam. 18 mill.

Alt. 24, diam. 23 mill.

Provinces of North and South Ylocos, Luzon, Philippines.

H. iloconensis SOWB., P. Z. S. 1840, p. 116.—PFR., Symb. ii, p. 30; Conchyl. Cab., p. 301, t. 51, f. 1–4; Monogr. i, p. 223.—REEVE, Conch. Icon., f. 109.—*Cochlostyla iloconensis* SEMP., Reis. Phil. Landmoll., p. 197, t. 18, f. 10 (dentition.)

Closely allied to *C. annulata*, but appreciably wider in the spire, having a more broadly reflexed lip and probably never having exactly the same color-patterns as that species. On many specimens there are scattered dots of a pale or purplish tint (fig. 98.)

All of the specimens I have seen, over 30 in number, may be referred to the following three color-varieties:

(1) Var. *heterotæniata*. Shell very solid, light buff, having a supra-peripheral yellow band and a subsutural pink band; a streak back of the broadly reflexed lip, and a circum-columellar patch pink. Both of the bands are sometimes yellow. The apex is pink.

(2) Var. *xanthotæniata*. Shell thinner; lip much narrower, thin; pale yellow, having subsutural and peripheral bands of yellow. No streak behind the lip, no columellar patch. The apex is white.

(3) Var. *intensior* (fig. 100.) Shell solid, lip wide; ground-color olive-brown or purplish-brown; light bands at periphery and suture, darker bands in the usual positions, sometimes obsolete on the body-whorl. Apex purple.

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Subsection 2. Orustia Mörch, 1852.

Orustia Morch, Catal. Yoldi, p. 15 (in part; first species *H. monticula* Sow.).—Semper (group of *Cochlostyla*), Reis. Phil. Landmoll. p. 196.

Shell imperforate, turbinate-globose, *rather thin*, green under a *hydrophanous yellow cuticle*, the base green. Lip thin, narrowly reflexed; columella vertical, deeply entering; the umbilico-columellar tract notably concave, covered with a white callus. Surface *wholly free from spiral sculpture.*

Anatomy as in *Cochlostyla* generally.

The entire absence of spiral sculpture and the presence of hydrophanous cuticle are the more important characters of the subtrochiform, thin-lipped species to which the name *Orustia* is restricted by recent authorities.

C. monticula Sowerby. Pl. 39, figs. 94, 95, 96.

Imperforate, globose turbinate, rather thin, lightly obliquely striatulate. Upper surface rich yellow and cream-colored, fading into white on the earlier whorls through loss of the cuticle; periphery girdled by a dark brown band, below which is a wider yellow band; base bright green.

There is no trace of spiral sculpture. The hydrophanous cuticle is rich yellow, sometimes almost orange, on the last whorl, becoming lighter above, and lost by erosion on the earlier whorls. The dark girdle at the circumference is constant throughout the large series which I have examined. There are 5 slightly convex whorls, the last not deflexed in front, not angled at the periphery, although the base is rather flattened. The apex is quite obtuse. Aperture oblique, half-round, white within, faintly showing the brown band. The lip is very narrowly subreflexed, white; columella subvertical, deeply inserted, dilated over the umbilico-columellar tract in a white concave callus, somewhat as in *C.* (*Chromatosphæra*) *aurata.*

Alt. 20, greater diam. 19½ mill.

Alt. 14½, greater diam. 16 mill.

H. monticula Sowerby, P. Z. S. 1840, p. 167.—Pfr., Monogr. i, p. 226; Conchyl. Cab. t. 51, f. 13–17.—Rve., f. 103.—*Cochlostyla* (*Orustia*) *monticula* Semper, *l. c.*, p. 197, t. 8, f. 6; t. 13, f. 1; t. 18, f. 23 (anatomy).

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Easily recognized by the yellowish upper surface, banded with brown at the circumference, and bright green base.

Of this species Semper says: I found this species exclusively in the wide valley of the Rio Grande de Cagayan, in northern Luzon; and as well at the village Aparri, hard by the valley's mouth, as in the upper mountainous course, on the western side of the eastern Cordillera, in the valleys of the rivers Ilagön and Catalangan, at Satpat, Ilagan and Minanga. The shell varies much . . . One example from Ilagan before me is entirely green, with a sulphur-yellow band at the periphery. Another from Satpat has a second broad brown band upon the upper surface, and the periphery is girdled by two narrow dark yellow bands, strongly contrasted with the clear yellow of the upper surface. The colors of the shell fade very readily. I suspect that Pfeiffer's *var.* β having a white shell, is founded upon a bleached example.

The anatomy is as in typical *Cochlostyla*.

Subsection 3. COCHLODRYAS Martens, 1860.

Cochlodryas MTS. in Albers, Die Hel. (2d edit.), p. 176, (Type, *C. polychroa*).—SEMPER, Reis. Landmoll., p. 198.—*Poecilus* ALB. *ms.*, preoc.

Elevated, vividly colored shells, lacking hydrophanous cuticle, and with a distinct sutural band which is generally white.

The Madagascar species *H. viridis* Dh. has been included here, but its place is in the vicinity of *Ampelita* (*q. v.*)

C. FLORIDA Sowerby. Pl. 38, figs. 70, 71, 72, 73.

Imperforate, solid, globose-elongated; ground-color grass-green (sometimes olive), having a *very narrow* white band at the suture, and frequently some brown bands, of which one is below the sutural white line, one at the columella, and two encircle the body-whorl near the middle. Some or all of these brown bands are often lacking.

The surface has light growth-lines, and under a lens faint fine spiral impressed lines are seen on the upper whorls. The grass-green or olive ground color fades into white or sometimes pink on the earlier whorls. Whorls nearly 6, the last scarcely deflexed in front. Aperture white within, oblique; lip reflexed, white; columella subvertical, slightly arcuate.

Alt. 37, diam. 29 mill.

Alt. 36, diam. 26 mill.

 Mindoro, Philippines.

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H. florida SOWB., P. Z. S. 1840, p. 87.—REEVE, Conch. Syst. ii, t. 163, f. 2; Conch. Icon., f. 43.—PFR., Mon. i, p. 222; Conchyl. Cab., p. 295, t. 50, f. 1, 2.—*Bulimus helicoides* PFR., Zeitschr. f. Mal. 1849, p. 176; Conch. Cab., Bul., t. 36, f. 7, 8.—RVE., Conch. Icon., f. 72.

A brilliant green shell, having the ground-color less streaked and the sutural white band narrower than *C. polychroa*. The green is sometimes changed to olive.

C. POLYCHROA Sowerby. Pl. 38, figs. 74, 75, 76, 77, 78.

Imperforate, globose or globose-elongated, rather thin; *conspicuously obliquely streaked with grass-green and whitish*, having a *wide white* (rarely red) *band at the suture*, and frequently banded with brown.

Surface smooth, lightly obliquely striatulate, the earlier whorls having microscopic spiral striæ when not worn. Whorls nearly 6, convex; apex obtuse. Aperture white within, oblique. Peristome rather narrowly reflexed, white; columella vertical, nearly straight, perceptibly truncated at its base.

Alt. 43, diam. 31 mill.

Alt. 43, diam. 34 mill.

Alt. 33, diam. 29 mill. (shortest specimen).

Alt. 39, diam. 29 mill. (most elongated specimen).

Island of Temple, near Burias, Philippines.

H. polychroa SOWB., P. Z. S. 1840, p. 87.—PFR., Monogr. i, p. 221; Conchyl. Cab. p. 295, t. 50, f. 13–15.—RVE., Conch. Icon. f. 44.—DH. in Fér. Hist. t. 104 A, 1–4; 110 A; f. 3–6.—*H. galactites var. picturata* GRAT., Actes Bord. xi, p. 163.—? *Helicostyla smaragdus* BECK, Index p. 37 (no desc.).—*Bulimus virido-striatus* LEA, Trans. Amer. Philos. Soc. 1841, p. 455, t. 11, f. 2.—*Cochlostyla (Cochlodryas) polychroa* SEMPER, Reis. Landmoll. p. 199.

The sutural band is wider than that of *C. florida*, the shell is thinner, and the columella more distinctly truncated at its base.

The color-forms of this beautiful species are numerous, the principal patterns being these:

(1.) Green and white streaked, bandless except for a wide sutural white zone (fig. 76).

(2.) The same, but sutural zone red, a brown patch around the columella.

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(3). Green and white streaked, sutural band white, having two brown zones around the middle, the upper ascending the spire, the columellar patch dark. There is often an additional brown line or band below the white sutural band (figs. 77, 78).

(4). Green largely replaced by reddish-brown (fig. 75), or by blackish-brown (fig. 74). Sometimes greenish-black.

C. ORBITULA Sowerby. Pl. 58, figs. 98, 99.

Imperforate, ovate-globose, thick and solid, smooth; light straw-colored with bands of brown and green, the former retained, the latter lost when the epidermis is removed. The suture has an opaque white margin below, about 1½ millim. wide on the last whorl.

Spire dome-shaped; apex obtuse; sutures superficial. Whorls 5 to 5½, slightly convex, the last slightly descending in front. Aperture rather small, oblique; lip expanded, reflexed, white; columella heavy, slightly arcuate, rarely dentate below.

Alt. 30, diam. 26 mill.

Alt. 26, diam. 26 mill.

Mindoro, Philippines.

H. orbitula SOWB., P. Z. S. 1840, p. 103.—PFR., Monogr. i, p. 224; Conchyl. Cab., p. 296, t. 50, f. 7, 8.—REEVE, Conch. Icon., f. 60.—DH. in Fér., Hist. i, p. 311, t. 108A, f. 7, 8.—*H. chlorogrammica* VAL., in Paris Mus.

The shell agrees with *C. florida* and *C. polychroa* in possessing a white margin below the suture, but it is much more compact and solid than either of these species. It is a more solid shell than *C. tenera.*

The coloring is very variable. There are generally (?) two chestnut-brown bands, one of which ascends the spire, but these are often lacking on the body-whorl. The green may either cover most of the body-whorl, or be restricted to a narrow band or two.

C. TENERA Sowerby. Pl. 36, figs. 31, 32.

Imperforate, globose-conic, thin, smooth; white, ornamented with blackish and green bands; subhyaline; spire depressed-conoid. Whorls 4½, a little convex; columella almost straight, thin, excavated; aperture lunate-rounded; peristome simple, little expanded. Alt. 20, greater diam. 25, lesser 21½ mill. (*Pfr.*)

Mindoro and Tablas, Philippines.

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H. tenera SOWB., P. Z. S. 1840, p. 102.—PFR., Conchyl. Cab., p. 293, t. 49, f. 12, 13; Monogr. i, p. 228.—REEVE, Conch. Icon., f. 62.

A more globose shell than *C. ignobilis*, with shorter spire, more convex whorls and differently formed lip.

C. IGNOBILIS Sowerby. Pl. 33, fig. 65.

Imperforate, rather solid, *conical*. White under a very thin light buff cuticle, with two narrow chestnut bands, one above, one below the periphery, and a dark columellar tract, often very small.

Surface lightly striatulate, the earlier whorls minutely, obsoletely spirally striated.

Spire distinctly conical, the lateral slopes slightly convex. Sutures but little impressed. Apex obtuse, but more acute than usual in the present group. Whorls 5½, very slightly convex, the last *angled* at the periphery; base rather flattened. Aperture oblique, ovate; lip expanded and reflexed, white. Columella subvertical, scarcely arcuate.

Alt. 33, diam. 24½ mill.

Alt. 28, diam. 25 mill.

Romblon and Tablas, Philippines.

H. ignobilis SOWB., P. Z. S. 1840, p. 102.—PFR., Monogr. i, p. 228; Conchyl. Cab., p. 292, t. 49, f. 11.—REEVE, Conch. Icon., f. 57.

The very distinctly conical spire of this species is a notable feature. The proportions of length and breadth vary considerable. The banding is usually as described above, but it varies as follows:

1. Bifasciate, the lower band wider (fig. 65.)
2. Upper band wanting.
3. Body-whorl not banded.

C. BOETTGERIANA Möllendorff. *Unfigured.*

Imperforate, globose-conic, rather solid, transversely striated, sculptured with minute spiral lines and forward-descending fold-like wrinkles; white, covered with an olive-buff shining deciduous cuticle, and encircled by two rather wide bands. Spire high conic, the apex rather obtuse. Whorls 5½, slightly convex, the last a little descending, sometimes ornamented with a third band around the columella; suture broadly margined, white, opaque, crenulated. Aperture oblique, ample, lunate-oval; peristome white-lipped,

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widely expanded and reflexed, the outer margin sinuous; columella rather straightened, excavated above, dilated, appressed. (*Möll.*)

Alt. 50, greater diam. 46, lesser 36 mill.; aperture (with perist.) 36 mill. long, 31 wide.

High mts. on the boundary between the provinces Bulacan, Manilla and Morong.

C. (*Helicostyla*) *boettgeriana* v. Moll., Nachr. D. M. Ges. 1888, p. 101.

Belongs to the group of *C. mirabilis* Fér. The acute conic spire, the broad dull white crenulated suture, the strong, almost fold-like oblique wrinkles, separate it from all species known to me. (*Möll.*)

Subsection 4. Helicostyla Fér., 1819.

Helicostyla Fer., Prodr. p. 46 (in part).

This section serves to contain the oblong or globose-conic species remaining after the segregation of the various allied groups. It is consequently rather miscellaneous as to contents and characters, but perhaps less so than in previous works, where it has been made still more comprehensive.

(1.) *Group of C. mirabilis.*

C. mirabilis Férussac. Pl. 57, figs. 79–86; pl. 31, fig. 40.

Imperforate, rather solid, globose; *ground-color unicolored yellow or brownish-yellow,* without bands, or variously banded with brown or black-brown, the bands when present being all of nearly the same color, and generally 4 in number; a narrow sutural line, two wider zones girdling the middle part, and a columellar patch.

Surface nearly smooth, lightly striatulate. Bands wide, narrow or none, and when present either blackish-brown or reddish-brown in color. Whorls nearly 5, the last but little descending in front. Aperture oblique, white inside and showing the bands; lip broadly reflexed, white, its reverse usually snow-white also; columella subvertical, gently arcuate, very deeply inserted, and visibly twisted near the insertion.

Alt. 36, diam. 34 mill. (average specimen.)

Alt. 40, diam. 29 mill. (elongated specimen.)

Alt. 30, diam. 32 mill. (short specimen.)

Southeastern and middle Luzon; Islet of Alabat, off E. coast Mauban; Marinduque, Philippines.

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H. mirabilis FER., Prodr. 320; Histoire, t. 31, f. 4–6.—SOWB., P. Z. S. 1841, p. 2.—PFR., Conchyl. Cab., p. 288, t. 48, f. 5, 7, 9, 10; Monogr. i, p. 220.—RVE., Conch. Icon., f. 45.—*H. formosa* WOOD, Index, Suppl., t. 7, f. 10.—*H. galactites* Lam., An. s. Vert. iv, p. 69. —*H. persimilis* DH. in Fér. Hist., p. 120, t. 110B, f. 2.—*Cochlostyla mirabilis* SEMPER, Reis., p. 192.—HIDALGO, Obras, t. 49, f. 1–7.

A globose shell, generally a little higher than broad, and excessively variable in both contour and pattern of coloring. The surface is often somewhat malleated. The ground-color varies from a very light buff to a yellowish-brown. It is allied to *C. fulgens*, differing mainly in the pattern of coloring.

Slight traces of whitish hydrophanous cuticle are observable near the suture in some specimens.

The principal varieties of banding are these:

(1.) Unicolored yellow; the earlier whorls white or having a purple supra-sutural band (fig.85). The earlier whorls are sometimes pink.

(2.) Yellow or buff, with a narrow sutural brown line, a subperipheral brown band, and a columellar patch. There are sometimes numerous yellow lines also (fig. 79.)

(3.) Yellow or yellowish-brown, with 4 wide or narrow bands, one columellar, another sutural, with two intermediate. This is the commonest pattern (figs. 81, 86.)

(4.) Yellow with reddish bands, *Marinduque*, (fig. 80.)

(5.) Entire shell very dark (fig. 84.)

Transition forms to var. fulgens.

Form *trichroa* (pl. 31, fig. 38). Having 4 wide or narrow blackish-brown bands, and three yellowish-brown bands in their intervals. The specimen figured is from Albay, Philippines. The figure on pl. 31 is united by error with that of *C. tephrodes*, below it.

Another deviation has the three brown or yellowish-brown bands, but no blackish bands (pl. 57, fig. 87).

A very large series of these transition forms is before me.

VAR. FULGENS Sowerby. Pl. 38, figs. 79, 80, 81.

Imperforate, globose or globose-turbinate, solid; *ground-color white above the periphery, yellowish-brown below it*, having normally 4 blackish-brown bands, one at suture, one at columella, the other two encircling the body-whorl at equal distances; the sutural band often absent, and sometimes additional bands are developed on base

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and at periphery; and there is usually a brown border below the sutural and above the supraperipheral bands.

Surface smooth, shining. Whorls 5, the last but little descending. Aperture oblique, white within; lip thin, narrowly reflexed, white; columella subvertical, straight, white.

Alt. 32, diam. 29 mill.

Alt. 35, diam. 28 mill.

Mindoro, Philippines.

H. fulgens Sowb., P. Z. S. 1841, p. 3.—Pfr., Monogr. i, p. 221; Conchyl. Cab. p. 287, t. 48, f. 3, 4.—Reeve, Conch. Icon. f. 31.

This is typically quite distinct in coloring from *C. mirabilis*, but every possible stage between the two is shown in the series before me. That it is idle to attempt to draw specific lines in such a case, I am convinced by the examination of a large suite of shells.

C. tephrodes Pfeiffer. Pl. 31, fig. 39.

Imperforate, subglobose, solid, ponderous; rufous above, nearly covered by wide streaks of hydrophanous ashen cuticle, the base straw-colored, banded with rufous. Whorls 4½, convex, the upper depressed, rounded, rufescent; columella wide, white, subarcuate. Aperture lunate-subcircular, white inside; peristome simple, reflexed. Alt. 30, greater diam. 37, lesser 33 mill. (*Pfr.*)

Prov. Pangasinon, Luzon, Philippines.

H. tephrodes Pfr., P. Z. S. 1842, p. 151; Monogr. i, p. 254.—Reeve, Conch. Icon., f. 112.

Var. Alternately and broadly zoned with rufous and yellow under a streaked cuticle. (*Pfr.*)

This variety is that figured by Reeve and copied on pl. 31.

C. plurizonata Adams & Reeve. Pl. 59, figs. 4, 5.

Subglobose, covered-perforate, white, clouded with pale brown spots, striate-roughened; encircled by several fawn and purple bands. Whorls 4, convex, the last rotund. Aperture lunate-transverse, brown inside; peristome strongly reflexed, white, lower margin somewhat calloused. (*A. & R.*)

Mindanao, Philippines.

H. plurizonata A. Ad. & Rve., Voy. Samarang, Zoöl., Moll., p. 62, t. 16, f. 9.—Reeve, Conch. Icon., f. 528.—Pfr., Mon. iii, p. 182.

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(2). *Group of C. collodes.*

C. COLLODES Sowerby. Pl. 46, fig. 56, 57.

Imperforate, solid, depressed-turbinate, the base distinctly flattened. Surface polished, straw-yellow, the earlier whorls pink, suture bordered below by a reddish-brown line. Lip expanded, its face and reverse black.

The form is somewhat trochoidal, base obviously flattened; surface shining, obliquely lightly striatulate. The color is a bright straw-yellow. Whorls 5½, convex, the last not deflexed in front. Aperture wide, oblique, white inside; columella subvertical, deeply entering, arcuate below.

Alt. 27½, diam. 30 mill.

Alt. 23, diam. 26½ mill.

Near Boljoon and Sambuan, southern Zebu, Philippines.

H. collodes SOWB., P. Z. S. 1840, p. 102.—PFR. Monogr. i, p. 253; Conchyl. Cab. p. 216, t. 108, f. 7, 8.—RVE., Conch. Icon. f. 64.—*Cochlostyla* (*Helicostyla*) *collodes* v. MOLL., Landschn. Cebu, p. 239.

Notable for its bright surface entirely free from hydrophanous cuticle, its flattened base, and black lip. Möllendorff gives measurements of larger specimens than those before me: alt. 30, diam. 36½ mill.

Variety. Whorls more convex, especially beneath; no brown sutural line; lip rather more broadly expanded, reddish-brown instead of black.

Alt. 27, diam. 30 mill.

Alt. 25, diam. 28 mill.

This form is not uncommon; several are before me.

Variety. Unicolored blackish-chestnut.

A very rare color-form, recorded by Pfr. and v. Möll.

The localities given by Pfeiffer and others are very doubtful. V. Möllendorff found it in Zebu, and upon this island my own examples were recently collected by Mr. E. L. Moseley.

C. INDUSIATA Pfeiffer. Pl. 46, figs. 53, 54.

Imperforate, depressed-turbinate, rather solid, nearly smooth; flesh-colored, covered with a tawny epidermis with pallid bands, having a sutural band of dark chestnut, another at the periphery and a columellar area of blackish. Spire short, conoid-convex.

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Whorls 4, scarcely convex, regularly increasing, the last scarcely descending in front, distinctly carinated at the periphery, base more convex. Aperture oblique, subrhombic-lunar, whitish inside, with translucent bands. Columella oblique, compressed, subexcavated; peristome blackish, margins subparallel, the upper expanded, basal shortly reflexed. (*Pfr.*) Alt. 18, diam. ·30 mill.

Tukan Bessi Island.

H. indusiata Pfr., Mal. Bl. 1871, p. 121; Novit. Conch. iv, p. 71, t. 121, f. 3, 4; Monogr. vii. p. 355.

Specimens of this species received through the kindness of Mr. J. H. Thomson are before me. The surface where the cuticle is removed, is opaque-white, faintly tinted with pink. The cuticle is straw-yellow, with a narrow sutural brown line, extending both above and below the actual suture, the portion above the suture becoming more prominent upward, and extending to the apex. At the periphery there is a brown line, scarcely visible on one specimen before me, the same specimen lacking the columellar dark tract, which is quite large on the other shell, of a purple-brown color, and staining the greater part of the columella. There is a very thin coat of hydrophanous cuticle above, with some slightly more distinct creamy spiral lines. Below the periphery there is a wide cream-white zone, and the base shows a number of narrow bands of the same tint.

C. thomsoni Pfeiffer. Pl. 29, figs. 1, 2, 3, 4.

Imperforate, solid, depressed turbinate-semiglobose; shining, lightly striatulate; bright straw-yellow, the earlier whorls pale pinkish; suture bordered below by a brown line. Lip expanded, its face and reverse blackish-brown. Whorl not deflexed at aperture.

The form is more depressed than any specimens of *C. collodes* I have seen, but, as in that species, the base is rather flattened. Whorls 5, convex, the last very obsoletely angulated in front of the aperture. Mouth white inside, quite oblique; lip expanded, deep brown. Columella arcuate, deeply entering.

Alt. 22½, diam. 30 mill.

"*Tukan Bessi Island*" (J. H. Thomson.)

H. thomsoni Pfr., Mal. Bl. 1871, p. 120; Novit. Conch. iv, p. 70, t. 121, f. 1, 2.

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This shell has the greatest resemblance to *C. collodes* of the island Zebu, differing only in being a little more depressed than any specimens I have seen of that species. Under the yellow cuticle it is white.

I do not know the location of the island *Tukan Bessi.*

(3). *Group of C. metaformis.*

C. METAFORMIS Férussac. Pl. 36, figs. 25, 26, 27, 28, 29.

Imperforate, solid, *oblong-ovate, elevated*, smooth, varying from buff to chestnut-yellow, unicolored or having dark chestnut bands at suture, periphery and columella, and frequently another on the base, any or all bands often absent, but the columellar band most constant. Generally covered with a hydrophanous buff-white cuticle worn into oblique shreds.

Spire elevated, the apex very obtuse. Whorls 6, the last descending in front. Aperture oval, oblique, white inside; lip white, narrow, slightly expanded, thickened; columella vertical, white, spreading in a shining white callus; slightly arcuate above, more or less strongly toothed below.

Alt. 43, diam. 31 mill. (average specimen.)

Alt. 54, diam. 33 mill. (large specimen.)

Alt. 32, diam. 25 mill. (small specimen.)

Bohol; middle Luzon.

H. metaformis FER., Hist. t. 108, f. 2.—PFR. in Conchyl. Cab. p. 289, t. 49, f. 1–5; Monogr. i, p. 222.—REEVE, f. 70.—*Cochlostyla metaformis* SEMP., Reis. p. 192, t. 13, f. 16; t. 18, f. 21 (anatomy). HIDALGO, Journ. de Conchyl. 1887, p. 149.—*Bulimus metaformis* GRAY, *et al.*—*Helix ovularis* MKE., Catal. Malsb. p. 4.

An oblong species, allied to *C. rustica* and especially *C. hydrophana*, the latter being scarcely more than a variety. The principal variations in contour and banding are shown on my plate.

There is an uncommon form having a chestnut rather than yellow ground-color, and a brown lip. A large specimen of this is shown in fig. 25.

I am inclined to consider the *C. rustica* of Hidalgo (not Mousson) as a color variety of this species. See pl. 58, fig. 89. Several shells corresponding to this figure are before me.

A form very closely allied to the true *C. rustica* is figured on pl. 58, fig. 90.

Another notable color-form is illustrated on pl. 58, fig. 88.

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C. RUSTICA Mousson. Pl. 58, figs. 91, 92.

Imperforate, oblong, solid, striate, chestnut-colored, covered with a gray cuticle.

Spire elongate-conic, summit obtuse, nude. Whorls 6, slightly convex, pallidly unifasciate, the last two-fifths of the total length, subinflated, ornamented with a black and a buff band around the umbilical region. Aperture oblique, lunate-circular, milk-white within; peristome narrowly expanded, subthickened; columella immersed, white, subcallous, *quasi*-unidentate. (*Mouss.*)

Alt. 53, greater diam. 37, lesser 32 mill.

Eastern Java.

Bul. rusticus MOUSS., Moll. Java, p. 114, t. 22, f. 1 (1849).—REEVE, Conch. Icon. V, t. 78, f. 574.—*cf.* HIDALGO, Journ. de Conchyl. 1887, p. 149.

This form is retained separate from *C. metaformis* only because of its different habitat. Certain forms of *metaformis* correspond closely with the figures and description of *rustica*, such as the shell figured as *rustica* by Hidalgo (pl. 58, fig. 89). Of this last form specimens are before me from Mt. Calanan. Another shell, even closer to *rustica*, is figured on pl. 58, fig. 90. Figure 92 is copied from Mousson's original illustration.

C. HYDROPHANA Sowerby. Pl. 36, figs. 35, 36, 37.

Imperforate, *oblong-ovate, elevated, thin.* Smooth; straw-yellow, with dark chestnut bands at suture, periphery and columella, and often a narrow band between the last two. Rarely all bands are lacking. Hydrophanous cuticle forming a thin film of oblique shreds, scarcely visible except on the bands.

Spire elevated, summit obtuse. Whorls 5, the last slightly deflexed in front. Aperture oval, white and showing the band inside; lip narrowly expanded and reflexed, white; columella subvertical, very deeply inserted, having an obtuse lobe below but not toothed.

Alt. 33, diam. 25 mill.

Alt. 25, diam. 22½ mill.

Mindoro, Philippines.

H. hydrophana SOW., P. Z. S. 1840, p. 88.—PFR. in Conchyl. Cab. t. 49, f. 8, 9; Monogr. i, p. 222.—REEVE, Conch. Icon. f. 69.—*C. hydrophana* HIDALGO, Journ. de Conchyl. 1887, p. 148.

Very closely allied to *C. metaformis*, but smaller, thinner, with a less thickened, non-dentate columella.

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C. BUTLERI Pfeiffer. Pl. 37, fig. 50, 51.

Imperforate, globose, rather thin; apex obtuse, white; spire semi-globose, suture moderate. Whorls 4½, nearly flat, the last inflated, pale buff, ornamented with close brown interrupted lines. Columella nearly straight, wide, deeply entering. Aperture rounded-lunar; peristome subthickened, forming an obtuse angle with the columella. (*Pfr.*) Alt. 28, diam. 37 mill.

Mountain districts of Benguet and Mancayan, and S. Nicolas in N. Ecija, Luzon.

H. butleri PFR., P. Z. S. 1842, p. 87; Monogr. i, p. 254; Conchyl. Cab., p. 284, t. 47, f. 11, 12.—PHILIPPI, Abbild., etc. i, p. 80, t. 4, f. 12.—RVE., Conch. Icon., f. 37.—*Cochlostyla butleri* SEMP., Reis., p. 193, t. 13, f. 2, 3, 6; t. 18, f. 13 (Anatomy.)

Semper regards this as probably a variety of *C. metaformis.*

C. FULIGINATA Martens. *Unfigured.*

Shell conic-globose, lightly striatulate, smoky-brown, hydrophanous, having two pale yellow zones, one just above, the other below the suture, the last visible upon the last whorl only, and small, irregular, shining brown-black spots; spire conical, apex obtuse; whorls 5, joined by a superficial suture, the last rounded, somewhat descending in front. Aperture oblique, square-rounded, palate cærulescent, parietal wall brown-black; peristome narrowly reflexed, thickened, bluish-white, outwardly rubescent; columellar margin rather oblique, nearly straightened. (*v. Mart.*)

Alt. 25, greater diam. 26½, lesser 23 mill.; aperture, oblique alt. 18, width including peristome 16 mill.

Luzon, Philippines.

Cochlostyla fuliginata MART. in Mal. Bl. xxi, p. 46, 1873.—v. MOLL., Nachrbl. D. M. Ges. 1890.—*Bulimus fuliginatus* PFR., Monogr. viii, p. 8.—*C. fumigata* "Mart." SEMPER, Reis. Phil. Landmoll., p. 198.

In general form it reminds one of *C. balteata* and *orbitula* Sowb., but the columellar margin is more oblique than in the first, and longer than in the latter of these two; the spire is more pointed above than in either of the species named, so that this snail stands between these and *Cochlostyla (?) viridis.* The coloring, however, is more that of the group *Orthostylus*, being similar, for instance, to that of *C. rufogastra.* (*Mart.*)

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Var. NIGROLABIATA Möll.

Less elevated, much thinner; peristome scarcely thickened, little expanded, black-brown; columella white, distinctly toothed. Alt. 22½, diam. 23 mill. (*Möll.*)

C. LANGUIDA Pfeiffer. Pl. 36, fig. 30.

Imperforate, globose, rather thin, regularly and closely obliquely striated. Apex obtuse, buff; suture marked by a shining brown line. Whorls 4½, a little convex, the last rufous, covered with an ashen hydrophanous cuticle, lineolate with white; base nude, shining. Columella vertical, white-calloused; aperture suboval; peristome ? (*Pfr.*) Alt. 30, diam. 30 mill.

Siquijor, Philippines.

H. languida PFR., P. Z. S. 1842, p. 150; Mon. i, p. 254.—REEVE, Conch. Icon. f. 68.

Described and figured from two decidedly immature examples.

C. UNICA Pfeiffer. Pl. 36, fig. 33.

Imperforate, globose, rather solid, obliquely striatulate, whitish; suture profound; whorls 5½, inflated, the upper nearly flat; columella profoundly entering, arcuate, subcanaliculate. Aperture very oblique, subcircular, white within; peristome widely expanded, inwardly reddish, margins approximating, basal thickened. Alt. 19, diam. 38 mill. (*Pfr.*)

Zamboanga, Mindanao, Philippines (Cuming).

H. unica PFR., P. Z. S. 1842, p. 151; Monogr. i, p. 253.—REEVE, Conch. Icon. f. 74.

C. LACERA Pfeiffer. Pl. 59, figs. 1, 2.

Imperforate, ovate-globose, solid, scarcely striated, brown, varied with a brown-ashen ragged cuticle. Spire semiglobose, obtuse; suture hair-margined with pale, not at all impressed above, becoming profound. Whorls 4½ the upper scarcely convex, the last two rounded, the last whorl somewhat ascending in front. Aperture oblique, subtetragonal-oval, livid inside; peristome narrowly expanded and reflexed, columellar margin somewhat straightened, flat, dilated, forming an angle with the basal margin. Alt. 30, greater diam. 33, lesser 27½ mill. (*Pfr.*)

Philippines.

H. lacera PFR., P. Z. S. 1853, p. 126; Monogr. iv, p. 206.—REEVE, Conch. Icon. f. 1266.

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C. REHBEINI Pfeiffer. Pl. 37, figs. 45, 46.

Imperforate, subglobose, solid, very delicately striatulate; white under a thin greenish-yellow, lusterless epidermis, encircled by several wide dark chestnut bands. Spire conoid-semiglobose, rather obtuse. Whorls 4½, moderately convex, rapidly increasing, the last rounded, shortly descending in front, blackish around the slightly sloping, wide, white subexcavated columella. Aperture oblique, lunate-round, whitish inside; peristome white, expanded-reflexed, somewhat thickened within. Alt. 20, greater diam. 27, lesser 23 mill. (*Pfr.*)

Philippines.

H. rehbeini PFR., P. Z. S. 1852; Monogr. iii, p. 189; Conchyl. Cab. p. 480, t. 159, f. 1, 2.—REEVE, Conch. Icon. f. 663.

C. PAPUENSIS Hedley. Pl. 58, fig. 97.

Shell globosely conical, imperforate, solid; color, the hydrophanous epidermis when wet or oiled is of a rich chocolate color; when dry, a pale yellowish-brown crossed by numerous narrow spiral brown lines; deprived of the epidermis the shell is a pale yellow, with a brown subsutural band, first two whorls purple-blue, interior of shell lustrous pale blue, peristome brown; whorls 5½, convex, regularly increasing, last ⅔ of total length; sculpture, entire shell finely obliquely striated and encircled by microscopic close regular raised lines; apex obtuse, embryonic whorls 1½; suture impressed, margined; aperture oblique, ovate lunate, peristome slightly reflected, a thin semi-transparent callus extends over the axis and curves up to the insertion of the right margin. Alt. 55, breadth 38 mill. (*Hedley*).

The Macleay Museum possesses several examples of this species purchased from Mr. Goldie, who collected them in British New Guinea. Considerable difference in size and form exists between these specimens, none of which are in a good state of preservation. One old and worn shell exhibits on the inner side of the columella a tubercle 10 mm. long and 2 mm. wide. Whether this be a distinct species, the adult form, or merely a variety of the species described above, requires further material to decide. (*Hedley.*)

British New Guinea.

Cochlostyla papuensis HEDLEY, The Land Molluscan Fauna of British New Guinea, in Proc. Linn. Soc. N. S. Wales, 2d ser., vi, p. 96, t. 12, f. 30 (March 25, 1891).

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The contour of this species throws it into the group of *C. metaformis*. In the case of this, as well as the other Australasian species of *Cochlostyla*, it is highly desirable that the genitalia be examined.

(4). *Group of C. fenestrata.*

The shell in this group is notably *compact and solid*, showing close, fine spiral striæ under a lens; and hydrophanous cuticle is present. The mouth is rather small, the *outer lip decidedly thickened within* with white callus; *the columella is pure white*, and decidedly thick, often truncated at base.

The limits of this group are doubtful, v. Möllendorff including in it *C. bruguieriana, crossei, roissyana, fuliginata, montana, curta, fenestrata, solida, dimera, jonasi.* A careful study of the whole matter has inclined me to believe that *bruguieriana* cannot well be sundered from *carbonaria* and other species of *Axina*, and I am not certain that *solida* and *crossei* should not also be included there. *C. roissyana* and *dimera* had better be left in the *Cochlostylæ hypomelaniæ*. Möllendorff's citation of *C. jonasi* in this connection is evidently due to Pfeiffer's mistaken reference in the Monographie, to the figures of the plate in Küster, the figures of *dimera* being given in error. On the other hand, I feel impelled to place in the present group a number of shells heretofore classed under *Orthostylus*, such as *C. leucophæa* and *C. mus;* but until the entire group can be studied in the light of a greater mass of material we will not be able to speak definitely upon these obscure group relations.

C. MONTANA Semper. Pl. 58, figs. 93, 94.

Imperforate, turbinate-globose or turbinate, solid, chestnut colored covered with a streaked hydrophanous cuticle, ornamented with two white bands, one at periphery, the other at the suture, and close whitish lines beneath. Spire conoidal, apex rubescent, obtuse. Whorls 5½, a little convex, the last convex and denuded on the base. Columella excavated, dentate, white. Aperture lunate-oval, milk-white within; peristome narrowly thickened, edged with black inside. Alt. 29, greater diam. 25, lesser 21 mill. (*S.*)

Foot of Monte Data, Mancayan, Luzon.

C. montana SEMP., Reis., p. 194, t. 9, f. 4.

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C. FENESTRATA Sowerby. Pl. 58, figs. 95, 96.

Imperforate, globose, solid; smooth; ground-color (under the hpdrophanous cuticle) dark chestnut, the earlier whorls whitish; *covered with a very thin hoary cuticle with oblique whiter streaks*, and having a *cream-white band just above and one below the periphery*. There is a *series of angular dark chestnut spots* a short distance below the suture, and the base is more or less denuded in front of the aperture.

Spire elevated; whorls 5, slightly convex, the last deflexed in front. Aperture rounded-truncate, bluish-white inside; lip thickened within, expanded, white with a brown edge. Columella steeply sloping, inconspicuously 2-lobed, its face flattened and shallowly grooved. Alt. 20, diam. 18½ mill.

Cagayan and N. Ecija, Luzon.

H. fenestrata SOWB., P. Z. S. 1840, p. 137.—REEVE, Conch. Syst. ii, t. 166, f. 24; Conch. Icon., f. 50.—PFR., Monogr. i, p. 227; Conchyl. Cab., t. 108, f. 9, 10.—*Cochlostyla fenestrata* SEMPER, Reis. Phil. Archip. Landmoll., p. 198.

A small species, readily known by the peculiar color-pattern. It is more allied to *C. montana* Semper than to any other species.

C. CURTA Sowerby. Pl. 37, figs. 47, 48.

Imperforate, ovate-conoid, solid and thick. Ground-color yellow (or black-brown), covered with a hydrophanous cuticle which is creamy above, brown on the base, and is deciduous in patches, showing a series of spots of the ground-color on the upper surface of the whorl. Surface microscopically spirally striated.

Spire conoidal, apex very obtuse. Whorls 6, almost flat, narrow, the last whorl slightly descending in front. Aperture small, oblique, white inside; peristome narrowly reflexed, strongly thickened within, white or brown edged. Columella short, oblique, white, very strongly thickened, more or less truncated below.

Alt. 29, diam, 23 mill.

Balanan, prov. La Union, northern Luzon, Philippines.

H. curta SOWB., P. Z. S. 1841, p. 20.—PFR., Monogr. i, p. 223; Conchyl. Cab. p. 429, t. 150, f. 8, 9.—REEVE, Conch. Icon. f. 34.—*Cochlostyla curta* HID., J. de C., 1887, p. 140.—*Bul. dilatatus* REEVE, Conch. Icon. f. 69.

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SECOND SERIES: PULMONATA.

MANUAL

OF

CONCHOLOGY;

STRUCTURAL AND SYSTEMATIC.

WITH ILLUSTRATIONS OF THE SPECIES.

BY GEORGE W. TRYON, JR.

CONTINUATION BY

H. A. PILSBRY,

CONSERVATOR OF THE CONCHOLOGICAL SECTION OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

VII

Part 4

PHILADELPHIA:

Published by Conchological Section,

ACADEMY OF NATURAL SCIENCES,

OF PHILADELPHIA.

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I have not seen the typical CURTA (pl. 37, figs. 47, 48), which has a light buff ground-color, the cuticle being pale above, brown below.

The shell called *B. dilatatus* by Reeve has the ground-color almost black, becoming rufous or yellow above, the lip dark-edged.

The variety β of Hidalgo, as well as the specimens before me, one of which is shown in fig. 15, are the same as the form called *B. dilatatus* by Reeve. While I am wholly disposed to consider these shells the same as Pfeiffer's *dilatatus*, it should be mentioned that Hidalgo has reached an opposite conclusion, from a study of Pfeiffer's figures. The suite before me shows very great variations in the degree of development of the columellar tooth, it being in some examples scarcely noticeably truncated.

Var. Pl. 60, fig. 16.

Larger, more elevated, very solid; black-brown below, rufous above. Whorls 6½. Columellar tooth very strongly developed. Alt. 40, diam. 28½ mill.

The specimen is denuded of cuticle.

Var. DILATATUS Pfr. Pl. 60, figs. 13, 14.

Chestnut-brown, tawny above, the last whorl having a white band below the suture.

B. dilatatus PFR., P. Z. S. 1846, p. 42; Conchyl. Cab. p. 110, t. 34, f. 7, 8; Monogr. ii, p. 8.

I am wholly inclined to consider this a mere variety of *C. curta*, founded upon a specimen denuded of hydrophanous cuticle, except for a band remaining below the suture on the last whorl. In case my supposition is correct, the name dilatatus may be retained in a varietal sense for all specimens of *C. curta* having a dark ground-color, including Reeve's *dilatatus*.

Section VIII. PTYCHOSTYLUS Möllendorff, 1888.

Ptychostylus MLLDFF., Nachrichtsbl. D. M. Ges., 1888, p. 74.—*Stylodonta* (in part) of authors.—*Columplica* (in part) HARTMANN, Gasterop. Schweiz, p. 187, 188 (*H. uniplicata* the first species; see under *Stylodonta unidentata*, this work, Vol. VI, p. 86).—Not *Ptychostylis* Gabb, a group of *Trochidæ*.

Shell globose-turbinate, formed of *many closely coiled whorls*, the surface having hydrophanous cuticle; aperture narrowly lunar; columella spirally twisted, *having a strong tooth-like fold* at the base.

Animal externally like *Cochlostyla*.

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The single species contained in this group has an aspect very different from the usual types of Cochlostyla. There are certain forms of *C. grandis* Pfr., however, which present an approach to the peculiar features of *C. cepoides*, especially in the short, twisted columella and the numerous whorls.

C. CEPOIDES Lea. Pl. 48, fig. 69.

Imperforate, globose-turbinate, the spire short-conoid. Ground-color brown above, yellowish beneath; hydrophanous cuticle forming a series of creamy blotches under the suture, and a band below periphery.

There are 6½ narrow, closely revolving, convex whorls. The base is very convex. Aperture narrowly lunar, oblique; lip somewhat expanded, thickened within, brown-edged; columella vertical, very short, having a strong tooth-like fold. Alt. 40, diam. 44 mill.

Is. of Luban, Philippines.

H. cepoides LEA, Trans. Amer. Philos. Soc. (n. ser.), vii, 1841, p. 462, t. 12, f. 14.—SOWB., P. Z. S. 1840, p. 88.—RV., Conch. Syst. ii, t. 164, f. 14; Conch. Icon. f. 39.—PFR., Monogr. i, p. 302; Conchyl. Cab. t. 41, f. 3, 4.—*H. (Stylodonta) cepoides* PFR., Nomencl. Hel. Viv. p. 170.—*H. dolium* SOWB., *ined.*—*Columplica dolium* HARTMANN, Gast. Schweiz, p. 188, t. 67, f. 1, 2.—*Nanina (Stylodonta) cepoides* TRYON, Manual of Conchology (2d ser.) ii, p. 26, t. 5, f. 86, 87.—*Cochlostyla (Ptychostylus) cepoides* MLLDFF., Nachr. D. M. Ges. 1888, p. 74.

This peculiar shell has long been classed with *Stylodonta unidentata* of the Seychelles Is., but there is now no doubt that Semper and Möllendorff are right in considering it a *Cochlostyla*.

Section IX. HELICOBULINUS Broderip, 1840.

Helicobulinus BROD., P. Z. S. 1840, p. 123, type *H. sarcinosa*.—*Helicobulimus* MOLLENDORFF, Landschn. Cebu, p. 241.—*Chromocochlea* HARTMANN, Gast. Schweiz, p. 137, 1844, type *C. turbinoides*.—*Chromatocochlias* AGASSIZ.

Shell capacious, *turbinate*-globose, solid, variegated with green or brown, covered with a variously patterned hydrophanous cuticle. Columella more or less folded.

This section, while closely allied to *Orthostylus*, presents affinities with so many groups that it must be regarded as an intermediate or synthetic type. Through *C. grandis* it approaches the section

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Ptychostylus; through certain depressed forms of *C. turgens* it approaches *C. harfordii* and other allied species of *Calocochlea;* and on the other hand, it is difficult to so diagnose *Helicobulinus* that all species of *Orthostylus* will be excluded.

The several species of *Helicobulinus* are, however, more nearly related to each other than the various forms are to any of these diverse groups, so that despite several atttempts by various authors to dismember the section, it is likely to maintain its integrity permanently.

C. GRANDIS Pfeiffer. Pl. 59, figs. 7, 8; pl. 60, figs. 9, 10, 11; pl. 48, figs. 66, 67, 68.

Imperforate, large, trochoidal or turbinate, solid, dark reddish-chestnut, covered with a cream colored hydrophanous cuticle which is cut by dark, narrow spiral bands, and is largely lost through erosion on the earlier whorls and the apertural part of the base.

The spire is elevated, conical; apex rather obtuse, whitish. Whorls 5½–6½, the last obtusely angular at periphery, somewhat concave or flattened below the angle. Aperture oblique, white or blue inside; peristome narrowly reflexed, purple-brown; columella very short, deeply entering, and having a strong fold near the insertion.

Alt. 50, diam. 60 mill.

Alt. 43, diam. 60 mill.

Northern Luzon, at Baler, Palanan, Digollorin, Casiguran and Camiguin de Luzon.

H. grandis PFR., P. Z. S. 1845, p. 43.—REEVE, Conch. Icon. t. 7, f. 30.—*Cochlostyla grandis* DOHRN, Mal. Bl. ix, p. 211, 1862.—SEMPER, Reis. Landm. p. 199.—*H. collosea* PFR., Zeitschr. f. Mal. 1852, p. 153; Conchyl. Cab. p. 422, t. 149, f. 1, 2.—*H. carolus* DH., Journ. de Conchyl. 1861, p. 348, t. 16, f. 1, 2.—*Cochlostyla carolus* HIDALGO, Journ. de Conchyl. 1887, p. 138.

This magnificent species may be known at once by its very short columella. It varies greatly in contour, the height of the spire and the number of whorls being unusually mutable. Semper is disposed to include "*Bulimus*" *lignarius* Pfr. with *grandis*, but the material before me, of both species, causes me to believe them entirely distinct.

C. SARCINOSA Férussac. Pl. 47, fig. 58.

Imperforate, capacious, globose-turbinate. Green, becoming fawn-tinted on the spire, encircled at the periphery by a chestnut band,

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which ascends the spire above the sutures. Having a band of hydrophanous cuticle below the peripheral girdle, usually almost entirely lost.

Spire conoid, apex very obtuse. Whorls 5½, the first nearly planate, the last slightly deflexed in front. Aperture large, blue-white within; lip narrowly expanded, purplish-pink; columella of the same color, subvertical, nearly straight, faintly obliquely truncated below. Alt. 72, diam. 64 mill.

Northern Negros; Masbate; Visayas; Batayan, Zebu.

H. sarcinosa FER., Hist. t. 109, f. 1, 2.—BROD., P. Z. S. 1840, p. 121.—REEVE, Conch. Icon. f. 5b; Conch. Syst. ii, t. 163, f. 7.—PFR., Monogr. i, p. 244; Conchyl. Cab. t. 40, figs. 1, 2 (not 3, 4). —*Bulimus sarcinosus* PFR., Symbolæ ii, p. 50.—*Cochlostyla* (*Orthostylus*) *sarcinosa* SEMP., Reis. p. 201.—*C.* (*Helicobulimus*) *sarcinosa* MLLDFF., Landschn. Cebu, p. 241.—*C. sarcinosa* HIDALGO, Journ. de Conchyl. 1887, p. 138.

The typical *C. sarcinosa* is a large, green shell, with a brown peripheral band. It is so intimately connected with the following that I am unable to say whether some of the specimens before me should be considered *turgens* or *sarcinosa*, and am therefore compelled to unite the species, as Pfeiffer at one time did.

Var. TURGENS Desh. Pl. 46, figs. 50, 51, 52.

Typically smaller than *sarcinosa*, the prevailing color brown instead of green. The hydrophanous cuticle is disposed in numerous revolving bands, interrupted irregularly by oblique brown streaks. Peripheral brown band either present or wanting.

Alt. 55, diam. 52 mill.

Alt. 70, diam. 55 mill.

Alt. 53, diam. 53 mill.

Panay, Guimaras and Luzon, Philippines.

H. turgens DH. in Fér. Hist. p. 316, t. 108 C, f. 11, 13.—*H. sarcinosa var.* PFR., Conchyl. Cab. t. 40, f. 3, 4.—*Cochlostyla turgens* SEMP., Reis. p. 201.—HIDALGO, Journ. de Conch. 1887, p. 138.

Excessively variable in contour.

C. TURBINOIDES Broderip. Pl. 47, fig. 63; pl. 62, fig. 29.

Imperforate, globose-turbinate; ground-color green, becoming reddish on the spire; having silvery hydrophanous bands.

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Spire conic, obtuse, reddish. Apex planate; whorls 5¼, convex, the last slightly descending in front. Aperture large, blue within; peristome expanded, reddish-brown.

Alt. 54, diam. 45 mill.

Alt. 50, diam. 70 mill.

Luzon, Leyte, Catanduanes and Camarines, Philippines.

H. turbinoides BROD., P. Z. S. 1840, p. 23.—PFR., Mon. i, p. 243; Conchyl. Cab. p. 264, t. 39, f. 1, 2.—RVE., Conch. Syst. ii, t. 166, f. 21, 22; C. Ic., f. 6.—*Cochlostyla turbinoides* HIDALGO, Journ. de Conchyl. 1887, p. 139.—*Chromocochlea turbinoides* HARTM., Gast. Schweiz, p. 137, t. 41.

Differs from the preceding in its red upper whorls, darker lip and columella, etc.

C. CINERASCENS Pfeiffer. Pl. 47, fig. 60.

Imperforate, globose-turbinate, rather thin; straw-colored with two wide bands and a blackish basal area, covered with a thin hydrophanous cuticle; spire short-turbinate, apex obtuse. Whorls 5½, a little convex, the last inflated beneath. Columella subarcuate, flesh-brown. Aperture round-lunar, white within; peristome narrowly expanded, somewhat thickened, chestnut-edged.

Alt. 37, greater diam. 41, lesser 35 mill. (*Pfr.*)

Masbate, Philippines.

H. cinerascens PFR., P. Z. S. 1845, p. 64; Monogr. i, p. 220; Conchyl. Cab. p. 427, t. 150, f. 1, 2.—REEVE, Conch. Icon. no. 78 (description), figure 81, *not fig.* 78!

I have not seen the typical *C. cinerascens*, but from a study of the figures and descriptions I am wholly inclined to consider *H. turbo* Pfr. a mere variety of it. Reeve has transposed the figures of these two forms on his plate.

Var. TURBO Pfr. Pl. 47, fig. 59.

Shell turbinate, solid; fleshy-brown under a straw-colored cuticle, having a peripheral band and a small columellar patch of chestnut. Spire conical, apex obtuse; whorls 5, the last a mere trifle descending in front. Aperture tinted within; lip well expanded, brown; columella steeply sloping, straight, white. Alt. 36, diam. 36 mill.

H. turbo PFR., P. Z. S. 1845, p. 64; Monogr. i, p. 220; Conchyl. Cab. p. 286, t. 48, f. 1, 2.—REEVE, Conch. Icon, no. 81 (descrip-

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tion), fig. 78, *not fig.* 81!—DESH. in Fér. Hist. t. 110 B, f. 1.—*C. turbo* HIDALGO, Journ. de Conch. 1887, p. 139.

Several specimens before me exhibit no variation. The published figures cited above are also very similar.

C. BEMBICODES Pfeiffer. Pl. 31, figs. 36, 37.

Imperforate, globose-turbinate, solid, striate; white under a dull buffish lusterless epidermis, with a chestnut band at the periphery. Spire turbinate, apex obtuse. Whorls 5, convex, the last rounded, little descending in front. Aperture very oblique, lunate-rounded, white inside and shining. Columella subvertical, straightened, dilated, flat, white; peristome white, upper margin expanded, basal narrowly reflexed, forming an obtuse angle with the columella.

Alt. 35, diam. 44 mill. (*Pfr.*)

Romblon, Philippines.

H. bembicodes PFR., Zeitschr. f. Mal. 1851, p. 15; Monogr. iii, p. 171; Conchyl. Cab. p. 408, t. 146, f. 6, 7.—*Cochlostyla bembicodes* HIDALGO, Journ. de Conch. 1887, p. 140.

This species seems near to *C. turbo* in form and coloring.

Section X. ORTHOSTYLUS Beck, 1837.

Orthostylus BECK (in part), Index, p. 49.—MARTENS in Alb. Die Hel. p. 177.—v. MLLDFF., Landschn. Cebu, p. 242.—*Pithohelix* SWAINS., Malacol. p. 166.—*Pythohelix* SWAINS., *l. c.*, p. 332.

The shell is generally large, solid ovate-conic, covered with a variously patterned hydrophanous cuticle. Aperture oblique, ovate; lip reflexed; columella nearly vertical, more or less obviously folded below.

Anatomy typical of Cochlostyla.

The present section is generally considered the typical group of Cochlostyla. It is allied to the section *Helicobulinus*, which consists of more inflated shells, and to the section *Hypselostyla*, containing more elongated forms. The limits of *Orthostylus* are not easy to determine, as there are species almost or entirely intermediate between this group and *Helicostyla*, as well as forms connecting with *Hypselostyla*.

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(1) *Typical species of Orthostylus.*

C. BICOLORATA Lea. Pl. 44, figs. 40, 41.

Imperforate, pyramidal, solid; *ground-color chestnut above, green below the periphery.* Covered with a brown hydrophanous cuticle which is streaked obliquely with lighter, and is varied by *a creamy band near the periphery, a series of alternating light and denuded dark blotches below the suture followed by another band,* and frequently a third band on the base.

The spire is notably pyramidal and elevated, apex rather obtuse. Whorls 6½. Aperture small, oblique, white inside; peristome dark chestnut colored, broadly expanded and reflexed. Columella vertical, obliquely truncated beneath, brownish.

Alt. 60, diam. 38 mill.

Alt. 63, diam. 42 mill.

Lucban, Prov. Tayabas, Luzon; Boac and Gasan, Marinduque; Alabat, Philippines.

Bul. bicoloratus LEA, Proc. Amer. Philos. Soc., p. 173, 1840; Trans. Amer. Philos. Soc. vii, p. 459, t. 11, f. 8, 1841.—RVE., Conch. Icon., f. 22.—*Cochlostyla bicolorata* MLLDFF. Nachr. D. M. Ges. 1889, p. 104.—*Bul. alberti* BROD., P. Z. S. 1841, p. 35.—PFR., Monogr. ii, p. 3; Conchyl. Cab. Bul., t. 50, f. 3.—*Cochlostyla alberti* SEMP., Reisen, p. 202.—HIDALGO, Journ. de Conch. 1887, p. 163; Obras, t. 65, f. 2, 3.—*Bulinus onyx* BROD., P. Z. S. 1841, p. 34.—*Bulimus onyx* PFR., Monogr. ii, p. 32.—*Cochlostyla alberti var. onyx* HIDALGO, Obras, Malacol. i, t. 65, f. 4, 5.

The ground-color is peculiar, being green below, chestnut-brown above the periphery. When quite denuded, the green color, being epidermal, disappears, white replacing it. There is sometimes a broad chestnut band beneath, conspicuously modifying the green color, and leaving green bands only at periphery and columella.

Var. ONYX Brod. Pl. 61, fig. 22.

More elongated and with the last whorl notably narrower.

Alt. 60, diam. 27 mill.; apert., alt. 29, diam. (inside) 16 mill.

Luzon.

C. IMPERATOR Pfeiffer. Pl. 45, figs. 42, 43, 44.

Imperforate, pyramidal, solid. Ground-color brown-black on the body-whorl, light brown on the two preceding whorls, the earlier

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whorls purple. *Hydrophanous cuticle forming conspicuous cream-white and rusty-brown obliquely longitudinal ragged stripes.*

Spire decidedly pyramidal, elevated, rather slender. Whorls nearly 7, the last indistinctly angular at the periphery, at times somewhat malleated, the indentations large and shallow. Aperture quite oblique, blue-white inside; peristome black-brown, well expanded. Columella vertical.

Alt. 71, diam. 43 mill.

Alt. 45, diam. 29 mill.

Is. Catanduanes; Prov. Tayabas, Luzon.

B. imperator Pfr.. P. Z. S. 1848, p. 110; Monogr. ii, p. 533; Conchyl. Cab. Bul., p. 158, t. 46, f. 1, 2.—Reeve, Conch. Icon. f. 183.—*Cochlostyla imperator* Hid., Journ. de Conch. 1887, p. 163; Obras Malacol. i, t. 65, f. 1.

A beautiful species, boldly painted with cream-white longitudinal stripes. From the province of Tayabas, Luzon, we have a variety scarcely half the size of typical examples (fig. 44.)

C. pithogaster Férussac. Pl. 40, figs. 2, 3, 4, 5.

Imperforate, oblong-conic or ovate-conic, solid. *Ground-color chocolate-black on the body-whorl, chestnut on the next earlier, yellowish-brown on the next, the earlier 2 or 2½ whorls dark blue-purple.* Hydrophanous cuticle *uniformly distributed or slightly streaked obliquely, of a drab or olive-slate color,* varying from dark to rather light.

Spire high-conoidal, apex *very obtuse.* Whorls 6–6½, the last a trifle deflexed in front. Aperture oblique, white inside; peristome reflexed, *inwardly flesh-pink, edged with black-brown;* columella irregularly arcuate, *flesh-pink,* generally not perceptibly truncated at base.

Alt. 61, diam. 40 mill. (typical form.)

Alt. 57, diam. 47 mill. (obese specimen.)

Alt. 50, diam. 33 mill. (small specimen.)

Camarines, Luzon; Alabat; Masbate and Marinduque, Philippines.

H. pithogaster Fer., Hist. t. 108, f. 3; t. 110, f. 1–3.—*Bulimus pithogaster* Pfr., Monogr. ii, p. 4; Conchyl. Cab. p. 169, t. 51, f. 1. —*Bul. pythogaster* Reeve, Conch. Icon. Bul. t. 1, f. 2*b*.—*Cochlostyla pithogastra* Semper, Reisen, p. 201, t. 13, f. 12 (anatomy).—*C. pithogaster* Hidalgo, Journ. de Conch. 1887, p. 163; Obras

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Malacol, t. 67, f. 1–4.—*Bul. philippinensis* PFR., P. Z. S. 1846, p. 42; Conchyl. Cab. p. 164, t. 50, f. 1.—REEVE, Conch. Icon. f. 5.—DH. in Fér. Hist. t. 110A, f. 10, 11.—*Cochlostyla philippinensis* SEMP., Reisen, p. 202.—*C. pithogaster var. philippinensis* HIDALGO, Obras, t. 67, f. 5.

The typical *C. pithogaster* is an elongated shell, covered with a uniform dark cuticle (fig. 5). It is impossible, however, to draw a line between the elongated forms and the short, obese forms, such as that shown in fig. 3. The intergradation is complete. It is equally impracticable to separate as a distinct species, the form called *philippinensis*, as all stages from a uniform to a streaked cuticle are present in the suite before me.

Color-var. *philippinensis* Pfr. Pl. 61, fig. 24.

Hydrophanous cuticle distinctly obliquely streaked.

Color-var. *bipartita* Pils. Pl. 61, fig. 23.

Ground-color dark brown below, lighter brown or yellowish above the periphery, earlier whorls whitish; hydrophanous cuticle not especially streaked.

Alt. 67, diam. 43 mill.

Alt. 59, diam. 38 mill.

C. VILLARI Hidalgo. Pl. 40, fig. 1.

Imperforate, ovate-conoid, solid, little shining, striatulate. *Buff, under a whitish-ashen cuticle, which is scarcely streaked; above paler, apex flesh-colored.*

Spire conoid, apex obtuse; suture seen under a lens to be minutely denticulated. Whorls 6, convex, the last large, about ½ the total length, descending in front, the base slightly depressed. Aperture rounded-subquadrate, white inside; peristome reflexed, white, angularly joining the white, rather wide and scarcely oblique columella. (*Hid.*)

Alt. 69, diam. 50 mill.

Boac, Gasan and Saban, Marinduque.

C. villari HID., Journ. de Conchyl. 1887, p. 166, t. 6, f. 3.

Var. Last whorl chestnut, the rest tawny, apex flesh-colored, columella rose-brown, peristome purple-black. (*Hid.*)

C. DAPHNIS Broderip. Pl. 42, figs. 20, 21, 22, 23.

Imperforate, ovate-*conic*, solid. Ground-color either (1) light olive-buff becoming lighter toward the white apex, or (2) chestnut-

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brown, darker below, becoming yellowish above, the apex flesh-tinted, or (3) base dark chestnut-brown, upper surface light buff-brown, or (4) body-whorl black-brown, the spire either pale or becoming purple toward the apex. *Hydrophanous cuticle cream-white,* rarely almost uniform, *generally conspicuously streaked obliquely or cut by spiral dark bands, or both cut and streaked.*

The spire is *very distinctly conoidal* and more acute than usual. Whorls 6½, the last somewhat descending. Aperture quite oblique, white or blue-white inside; peristome well expanded, brown, *edged with black-brown. Columella vertical, simple and straight,* flesh-tinted or purple-pink.

Alt. 50, diam. 36 mill.

Alt. 63, diam. 46 mill.

Islands Bohol, Siquijor, Magtan and southern Zebu, Philippines.

H. daphnis BROD., P. Z. S. 1840, p. 180.—DELESSERT, Rec., t. 39, f. 13, 14.—*Bulimus daphnis* PFR., Monogr., ii, p. 4; Conchyl. Cab., t. 51, f. 4.—RVE., Conch. Icon., f. 8.—DH. in Fér., Hist., t. 151, f. 5, 6.—*Cochlostyla daphnis* SEMPER, Reisen, p. 205.—HIDALGO, Journ. de Conch. 1887, p. 166.—v. MOLL., Landschn. Cebu, p. 243.

This species is excessively variable in the ground-color as well as in the pattern of cuticle. The latter, however, has no zones of greater intensity or whiteness, such as *C. lignaria* shows below the periphery. The spire is notably conoidal, the narrower specimens of typical *daphnis* approaching in this respect, *C. imperator,* a species quite different in the form of the columella.

C. CUNCTATOR Reeve. Vol. VIII, pl. 12, figs. 1, 2.

Imperforate, ovate-conic, solid. Ground-color brownish olive-green, becoming yellowish on the spire, the earlier whorls flesh-colored or purple. Hydrophanous cuticle cream-colored, becoming brownish below, disposed in *very close, narrow,* oblique stripes. A few narrow, inconspicuous darker spirals are visible.

Spire conoidal, obtuse. Whorls 6. Aperture blue within; peristome narrowly expanded, edged with black-brown. Columella purple-pink, straight above, gently arcuate below; not in the least truncated below.

Alt. 52, diam. 38 mill. (average specimen).

Alt. 49, diam. 39 mill. (short specimen).

Alt. 60, diam. 38 mill. (elongated specimen).

Zebu, Philippines.

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Bul. cunctator REEVE, Conch. Icon. f. 554, 1849.

This form is closely allied to *C. daphnis*, differing in being slightly less conoidal, and in the pattern of cuticle. It is likely that intermediate forms will be found. Reeve's figure was drawn from an immature example.

C. FAUNUS Broderip. Pl. 61, figs. 17, 18, 19.

Imperforate, ovate-conoid, solid. Ground-color varying from dark chestnut to light yellow-brown, the darker specimens becoming lighter above the periphery and on the spire; apical whorls purplish. Covered with a light brown hydrophanous cuticle, which is either almost uniform, or obliquely streaked having few or many darker spiral lines.

Spire conoid, apex decidedly obtuse. Whorls 6, the last slightly descending. Aperture quite oblique; peristome narrowly reflexed, having a black-brown edge. Columella vertical, nearly straight, flesh-tinted.

Alt. 51, diam. 34 mill. (average example.)
Alt. 43, diam. 29 mill. (small example.)
Alt. 54, diam. 31 mill. (narrow example.)

Zebu; Camotes Is.; Masbate, Philippines.

B. faunus BROD., P. Z. S. 1840, p. 180.—PFR., Monogr. ii, p. 5; Conchyl. Cab. t. 51, f. 7.—REEVE, Conch. Icon. f. 13.—HIDALGO, Journ. de Conch. 1867, p. 167; Obras, t. 62, f. 4, 5.—*Cochlostyla daphnis var. faunus* SEMPER, Reisen, p. 205.—MLLDFF., Landschn. Cebu, p. 243.

Less variegated than *C. daphnis*, narrower in form, the spire not so conical as that of *C. daphnis*, and not so acute.

Both Semper and Möllendorff believe *faunus* to be a variety of *daphnis*, but the differences of contour are so constant throughout the large suites of each before me, that I am still inclined to consider them distinct species. There is a common form of *C. daphnis* having the cuticle uniform, not variegated. A specimen of this from Zebu is shown on pl. 42, fig. 21.

C. TICAONICA Broderip. Pl. 62, figs. 25, 26, 27, 28.

Imperforate, ovate, solid. Ground-color dark chestnut, becoming lighter on the spire, the earlier whorls light brown or purple-brown. Hydrophanous cuticle white above, tinted with brown below, disposed in wide or narrow oblique streaks, uninterrupted or cut by dark spiral lines.

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The spire is obtusely conoid; apex obtuse. Whorls 5½, the last somewhat descending in front. Aperture quite oblique, bluish-white inside; lip narrowly reflexed, dark brown or edged with dark brown; columella subvertical, deeply inserted, flesh-tinted.

Alt. 58, diam. 42 mill.

Alt. 44, diam. 34 mill.

Alt. 56, diam. 38 mill.

Islands of Ticao, Masbate, northern Zebu, northern Negros, Philippines.

H. (*Cochlostyla*) *ticaonica* BROD., P. Z. S. 1840, p. 155.—*Bul. ticaonicus* PFR., Monogr. ii, p. 6; Conchyl. Cab. p. 175, t. 52, f. 1–3.—REEVE, Conch. Icon. f. 14.—*Cochlostyla ticaonica* SEMPER, Reisen, p. 202.—HIDALGO, J. de C. 1887, p. 167.—MILLDFF., Landschn. Cebu, p. 242.—*Bul. subglobosus* LEA, Trans. Amer. Philos. Soc. vii, p. 455, t. 11, f. 1 (young shell).

This species is allied to *C. daphnis*, but it is shorter, with lower, much more obtuse spire.

The ground-color is sometimes dark below, decidedly lighter above the periphery. The prevailing form upon the island Zebu (figs. 26, 27) is small, with conspicuous longitudinal white stripes, but few spiral lines or none.

Color-form *lutea*. Pl. ~~52~~ 49, fig. 25.

With the typically colored examples of *ticaonica*, live others having a light buff ground-color, overlaid with cuticle forming oblique white streaks above, generally rusty-brown beneath. The lip is white, its edge often flesh-pink. Columella purple-pink.

C. LIGNARIA Pfeiffer. Pl. ~~52~~ 49, fig. 30; pl. 41, figs. 10, 11, 12, 13.

Imperforate, turbinate-conic, solid. *Ground-color uniform dark chestnut*, becoming lighter and then yellow-chestnut above, the apex whitish. Hydrophanous cuticle wood-brown streaked with cream, *having a cream-white zone under the periphery*, and few (fig. 10) or many (fig. 12) dark spiral lines.

Spiral conoidal, apex obtuse. Whorls 5½, the last somewhat descending in front, *obtusely angular at the periphery in front*, the degree of angulation varying from distinct to almost imperceptible. Aperture quite oblique, nearly white inside; peristome expanded

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and reflexed, dark brown. Columella oblique, indistinctly or obviously folded below.

Alt. 64, diam. 58 mill. (large typical form.)

Alt. 51, diam. 38½ mill. (var. minor.)

Alt. 60, diam. 41½ mill. (elongated form.)

Prov. Cagayan, Luzon.

Bulimus lignarius PFR., P. Z. S. 1842, p. 88; Monogr. ii, p. 3; Conchyl. Cab. Bul. t. 19, f. 1, 2.—REEVE, Conch. Icon. Bul. t. 1, f. 3.—DH. in Fér. Hist. t. 151, f. 8, 9.—*Cochlostyla lignaria* SEMPER, Reisen, p. 202.—HIDALGO, Journ. de Conch. 1887, p. 160.

The creamy subperipheral zone is a constant and reliable feature. The peripheral angulation is scarcely noticeable in the smaller specimens, such as those figured on pl. 41, and which are much more numerous in collections than the larger form. These small specimens are about the size of *C. daphnis*, but that species is more distinctly conical, more acute than this, and it lacks the subperipheral creamy zone.

Semper has stated that it is difficult to distinguish the more obviously angular forms of *C. lignaria* from *C. grandis* Pfr., and he has therefore united the two; but with all respect for the opinion of the distinguished German zoologist, we must still consider these species perfectly distinct. It is hard to even imagine a connection.

C. GILVA Broderip. Pl. 42, figs. 24, 25, 26.

Imperforate, globose-ovate, solid. Ground-color dark chestnut, begirt with an indistinct darker peripheral band, and becoming lighter above, the earlier whorls whitish with a brown subsutural margin. Hydrophanous cuticle forming a uniform cream-white or light brown coat.

Spire bluntly conoid, the apex very obtuse. Whorls 5½, the last generally deeply descending in front. Aperture large, blue-white within; lip rather broadly reflexed, white, sometimes brown-edged. Columella nearly vertical, wide, white.

Alt. 45, diam. 40 mill.

Alt. 42, diam. 37 mill.

Philippines.

B. gilvus SOWERBY, (in Coll. Cuming); PFR., P. Z. S. 1845, p. 45; Conchyl. Cab., p. 179, t. 53, f. 1.—REEVE, Conch. Icon., f. 7.

Allied to *C. ticaonica*, but more globose, with shorter spire, more uniformly distributed cuticle, whiter, wider lip, and having an indistinct darker peripheral band.

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C. WOODIANA Lea. Pl. 43, figs. 28, 29.

Imperforate, oblong-conic, solid. *Ground-color dark chestnut*, becoming light yellowish-brown above, and black on the latter part of the body-whorl; covered with cream-colored hydrophanous cuticle, which is cut into bands by a number of dark, denuded broad zones and narrow lines.

Spire conical, apex obtuse, yellow-brown. Whorls 5½, the last whorl slowly descending, equal to the spire in height. Aperture oblique, blue-white inside; peristome broadly, roundly reflexed, brown or fleshy-violet; columella vertical, gently arcuate, flesh-colored, forming a slightly projecting angle where it joins the basal lip. Alt. 70, diam. 50 mill.

Provinces Tayabas and Laguna, Luzon, Philippines.

Bulimus woodianus LEA, Proc. Amer. Philos. Soc. i, p. 173 (read Feb. 21, 1840; Proc. for Jan. and Feb., 1840, distributed March 20, 1840); Trans. Amer. Philos. Soc. vii, p. 457, t. 11, f. 5.—NOT *B. woodianus* PFR. *et al.*—*H. Reevii* BROD., P. Z. S. 1841, p. 34.—*Bulimus Reevii* RV., Conch. Syst. ii, t. 172, f. 1; Conch. Icon., f. 6.—*B. reevei* PFR., Monogr. iii, p. 295; Conchyl. Cab., Bul., t. 19, f. 5, 6.—DESH. in Fér., Hist., t. 116, f. 1, 2.—*Cochlostyla reevei* SEMPER, Reisen, p. 203.—HIDALGO, Journ. de Conchyl. 1887, p. 160.—*C. woodiana* v. MOLL., Nachr. D. M. Ges. 1889, p. 104.

This is a magnificent species, allied to *C. portei*, but differing in coloring. It is not especially related to any other species.

Lea's heretofore unquoted description in the Proc. Amer. Philos. Soc. has indisputable priority of publication over Broderip's description in P. Z. S. under the name *Reevii*. The change of name is, therefore, inevitable. It is surprising that so careful an author as Pfeiffer should confound Lea's dark brown shell with the totally diverse white species which has always been called *woodianus*.

I have examined Lea's type of *woodiana*. It is denuded of the creamy hydrophanous cuticle, except just behind the expanded lip, where it shows the characteristic banding of the species.

C. PORTEI Pfeiffer. Pl. 44, figs. 38, 39.

Imperforate, ovate-conic, solid; *ground-color green*, becoming buff on the earlier whorls; covered with a hydrophanous cuticle of *white, obliquely streaked with tawny*, which is cut by a couple of peripheral denuded zones and a number of lines.

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Spire conoid, apex obtuse; whorls 5½, the last scarcely descending, more than half the total height of the shell. Aperture oblique, large, blue-white inside; peristome broadly and roundly reflexed, dark chestnut-brown. Columella vertical, slightly arcuate, slightly salient at its junction with the basal lip.

Alt. 70, diam. 54 mill.

Alt. 60, diam. 45 mill.

Island of Polillo; District of Infanta, Prov. Laguna, Luzon, Philippines.

B. portii PFR., P. Z. S. 1861, p. 193 (typog. err. for *portei*); *B. portei* PFR. Novit. Conch., p. 308, t. 75, f. 1–3; Monogr. vi, p. 5.

The ground-color is green, and the brown-lipped aperture is larger than in *C. woodiana* Lea (*reevei* Brod.), a species similar in pattern of cuticle.

C. RUFOGASTER Lesson. Pl. 43, figs. 26, 27; pl. 45, fig. 47.

Imperforate, ovate-conoid, solid. *Ground-color chocolate or dark chestnut, with a buff band at the periphery.* Hydrophanous cuticle dull brown, varied by a *series of creamy, oblique dashes* below the suture, alternating with blotches of the dark ground-color of equal size, and having *a light creamy zone at the periphery*, and another at the columella.

Spire high-conic, apex obtuse. Whorls 6–6½, the last *very* indistinctly angled at the periphery in front. Aperture oblique, white or lilac-white inside; peristome rather narrowly, roundly reflexed, chocolate colored; columella subvertical, somewhat arcuate, flesh-white or brown, forming a rather salient angle where it joins the basal lip.

Alt. 76, diam. 54 mill. (typical.)

Alt. 54, diam. 43 mill.

Alt. 45, diam. 35 mill. (v. *minor.*)

Tuan, Prov. of Bulacan; Porac, prov. Pampanga; Los Banos, Laguna; S. Nicolas, N. Ecija, and Baler, on the E. coast, Luzon.

H. rufogaster LESS., Illustr. de Zool., t. 22, 1831.—*Bulimus rufogaster* PFR., Monogr. iii, p. 6; Conchyl. Cab., t. 50, f. 2.—REEVE, Conch. Icon., f. 4.—DH. in Fér., Hist., t. 116, f. 3, 6.—*Cochlostyla rufogaster* SEMP., Reisen, p. 202.—HIDALGO, Journ. de Conchyl. 1887, p. 160.—*Bul. monozonus* PFR., P. Z. S. 1848, p. 110; Monogr. ii, p. 533; Conchyl. Cab., t. 46, f. 7, 8.—REEVE, Conch. Icon., f. 195.

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This large species has the contour of *C. woodiana* Lea (not Pfr.), but is differently colored and the lip is narrower. It is even more allied, probably, to the narrower, more pyramidal *C. bicolorata* Lea.

Pfeiffer's *B. monozonus* (pl. 45, fig. 47) is merely a rather small example, but I have seen specimens still smaller. Localities for these small specimens are: Santa Ana, prov. Manilla; Lucban prov. Tayabas; San Rafael, prov. Bulacan, Luzon.

C. MACROSTOMA Pfeiffer. Pl. 61, fig. 20.

Imperforate, ovate, rather solid. Rufous-black, the apex paler; covered with a brown hydrophanous cuticle, encircled by black lines. Whorls 6, a little convex, the last about equal to the spire in length. Columella vertical, dilated, somewhat thickened in the middle, its inner part dark brown, outer lip strongly arcuate.

Alt. 61, diam. 39 mill. (*Pfr.*)

Mts. near Balanga, prov. Bataan, Luzon, Philippines.

B. macrostomus PFR., P. Z. S. 1842, p. 152; Monogr. ii, p. 24; Conchyl. Cab., t. 50, f. 4, 5.—REEVE, Conch. Icon., f. 1.—*Cochlostyla macrostoma* HID., Journ. de Conch. 1887, p. 161.

C. VIDALI Hidalgo. Pl. 60, fig. 12.

Imperforate, ovate, solid, obliquely striated. Under a thin, deciduous hydrophanous cuticle, of a deep purple-brown color. Spire conoid, apex obtuse, concolored, purple; suture impressed, destitute of spots. Whorls 6, nearly flat, the last about equaling the spire, encircled with a little-conspicuous pale buff band; base attenuated. Aperture angulate-ovate, moderate, inside livid-white; peristome narrowly reflexed, edged with dark purple, margins distant, joined by a thin, wide callus; columellar margin deeply intorted, quasi-truncate, purple-white; basal margin narrowly rounded, forming an angle where it joins the columella, outer margin becoming thin toward its insertion.

Alt. 67, diam. 40 mill.; apert. with perist., 37 mill. long, 26 wide. (*Hid.*)

Galiano, district of Benguet, Luzon.

C. vidali HID., Journ. de Conch. 1887, p. 162, t. 7, f. 2.

This species is truly intermediate between *C. rufogaster* and *C. macrostoma*. It differs in being more *ovoid*, less *conoidal*; the whorls more swollen; the spire is more obtuse and darker than the rest of the shell, not lighter, as it is in the two allied species. The cuticle

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has no blotches below the suture; it is thinner than in *macrostoma*, and the hydrophanous band is not accompanied by a dark line, etc.

C. JUGLANS Pfeiffer. Pl. 59, fig. 6.

Imperforate, elongate-globose, the apex obtuse; rather solid, obliquely distinctly striated, unicolored rufous. Whorls 5, convex, the last about equal to the spire. Columella wide, white, arcuately curved inward. Aperture large, irregularly suboval, sinuated at base of the columella, pale livid inside; peristome scarcely reflexed, margined with rufous.

Alt. 53, diam. 35 mill. Aperture 28 mill. long inside. (*Pfr.*)

Mountains of northern-central Luzon.

Bul. juglans PFR. P. Z. S. 1842, p. 89; Monogr. ii, p. 7; Conchyl. Cab., p. 177, t. 52, f. 7.—REEVE, Conch. Icon., f. 12.—*Cochlostyla juglans* SEMPER, Reisen, p. 204.—MLLDFF, Nachr. D. M. Ges. 1888, p. 105.

Fresh, unrubbed shells, says Möllendorff, are covered with a thin gray-brown cuticle, which often shows close spiral lines. The peristome is lipped with beautiful purple-brown; the columella is white above.

Var. *olivacea* Mlldff. Smaller, more ventricose, whorls more convex; olive-brown or olive-yellowish, the peristome white. (*Mlldff.*)

Alt. 55, diam. 43 mill.

Alt. 50, diam. 41 mill.

Var. *roseolimbata* Mlldff. More ventricose, olive-yellowish, varied with irregular streaks; peristome more thickened, margin pale purple or rose, columella more spirally twisted, arcuate. (*Mlldff.*)

Alt. 63, diam. 49 mill.

Alt. 59, diam. 46 mill.

Cuyapo, prov. Nueva Ecija, Luzon.

C. MARINDUQUENSIS Hidalgo. Pl. 45, figs. 48, 49.

Imperforate, ovate-conic, solid. Under an evanescent deciduous cuticle *the surface is white,* unicolored or with *peripheral and columellar dark bands,* or having the middle and base of the body-whorl dark brown. Sometimes there is a narrow sutural band; *lip lilac-pink, black edged,* rarely pure white.

Spire conoidal; whorls 6, *convex,* especially the latter two. Last whorl generally obliquely malleated around the middle. Aperture oblique, white inside; *peristome broadly expanded and reflexed,* lilac

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pink with a black-brown edge; columella very deeply inserted, lilac-pink, expanding in a blackish callus.

Alt. 64, diam. 46 mill.

Alt. 57, diam. 42 mill.

Boac, Gasan and Saban, Marinduque; Romblon, Philippines.

C. marinduquensis HIDALGO, Journ. de Conch. 1887, p. 157.—*Bulimus woodianus* PFR., Conchyl. Cab., p. 171, t. 51, f. 5.—REEVE, Conch. Icon., f. 11.—DH. in Fér., Hist., t. 110A, f. 7–9.—NOT *Bulimus woodianus* LEA,=*C. reevei* Brod.

The peculiar coloration of this species readily distinguishes it from all others, although it is quite variable. Some specimens are uniform white; others have the median and basal portions of the body-whorl blackish-brown; but the most frequent form is that represented by fig. 48.

This species has long been known under the name "*C. woodiana* Lea," but Lea's species is a totally different shell.

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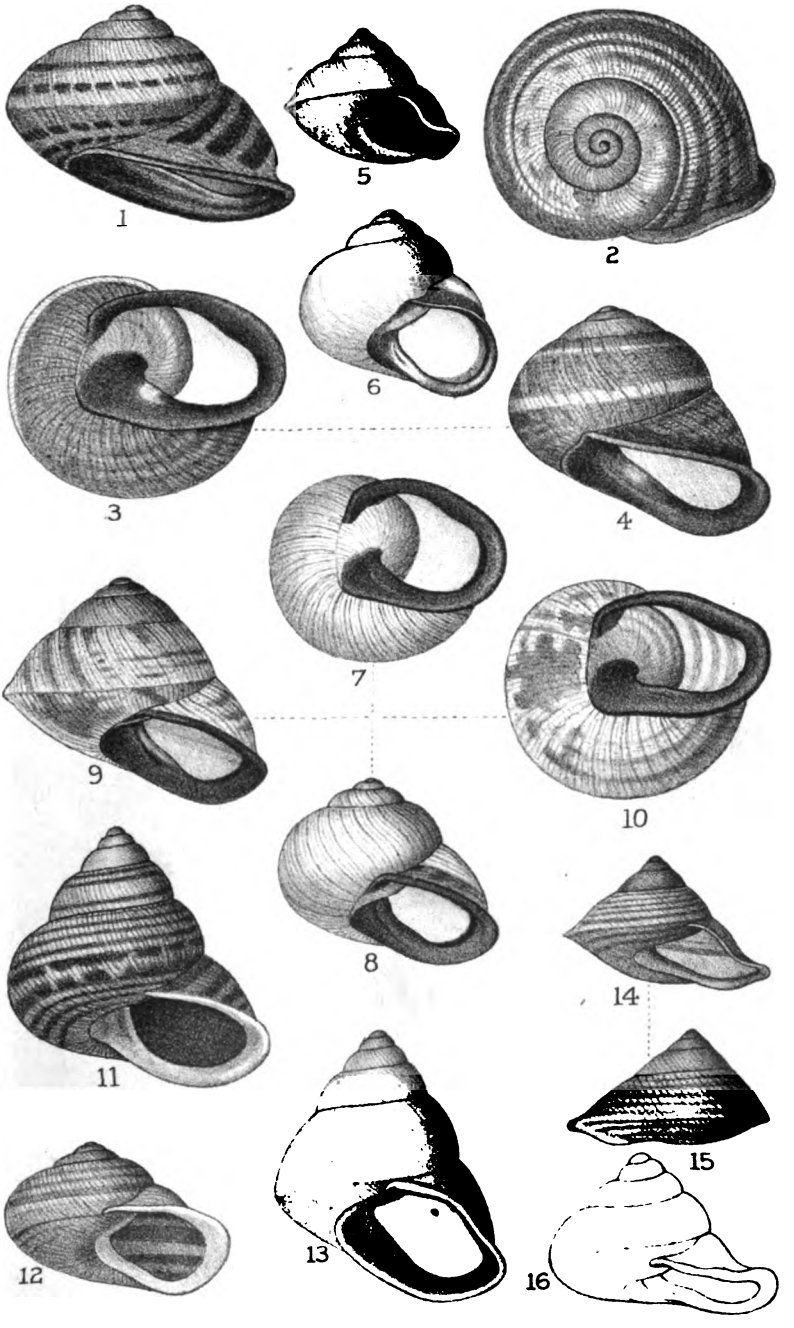

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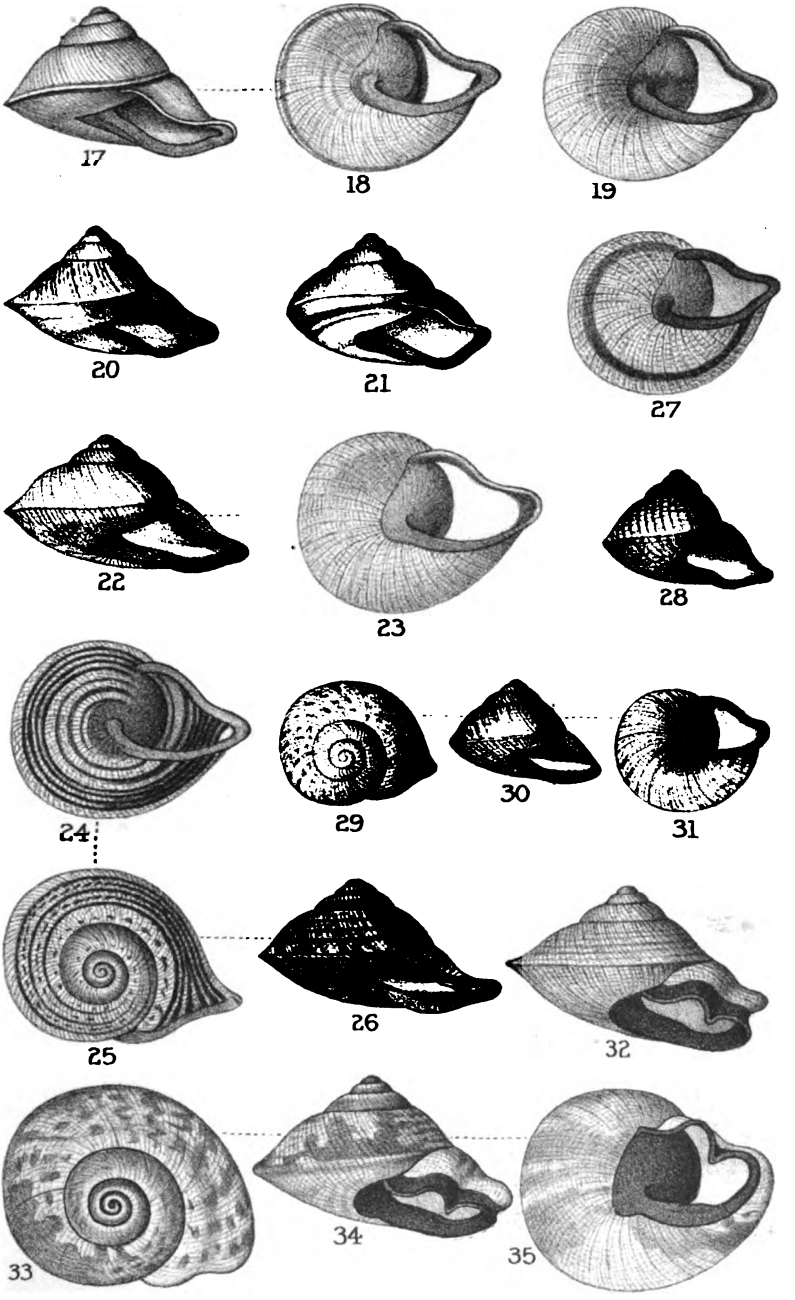

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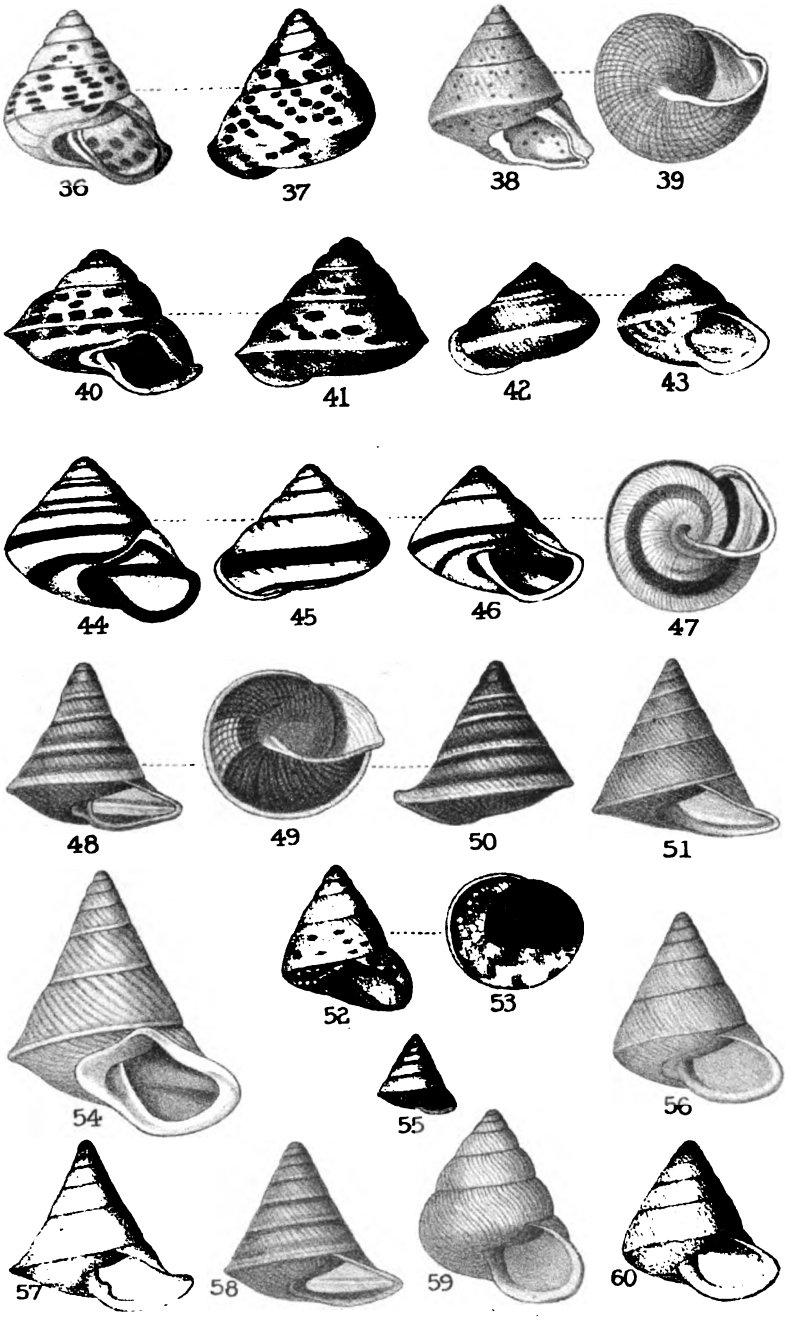

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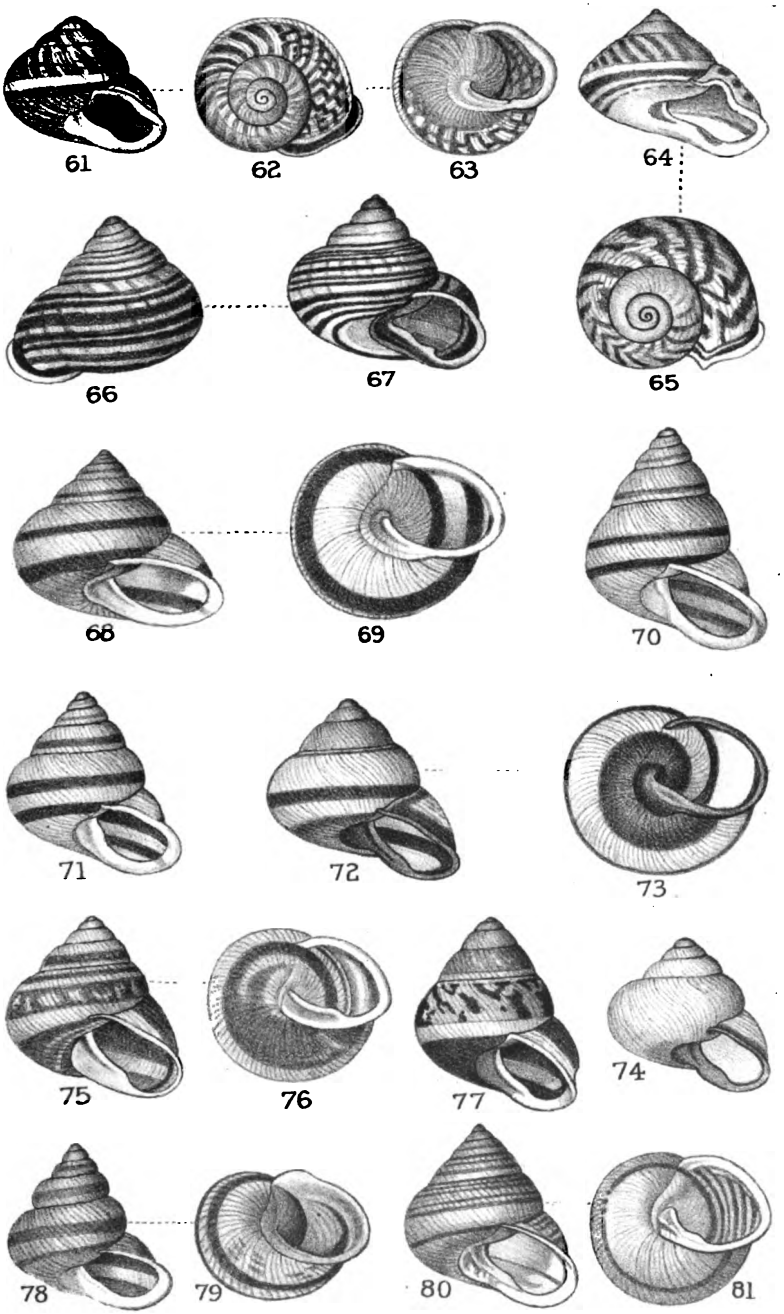

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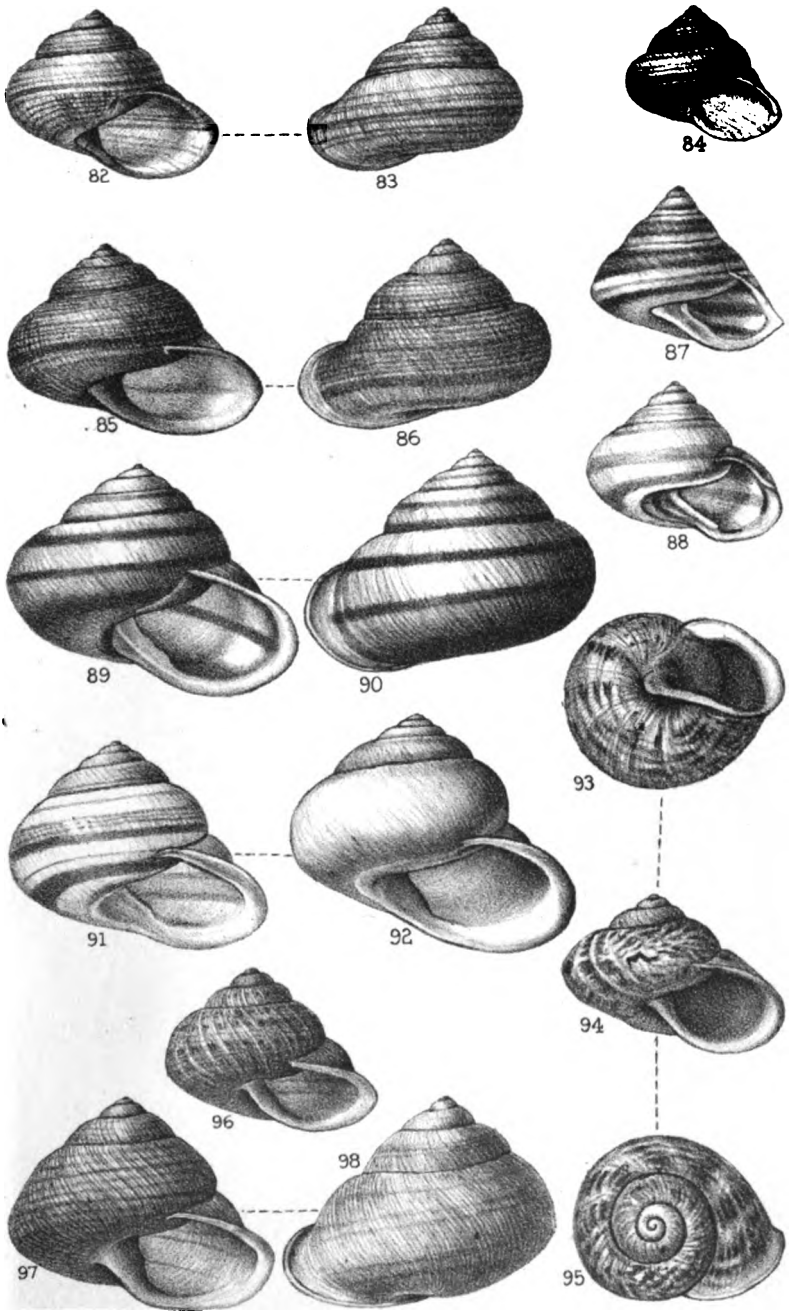

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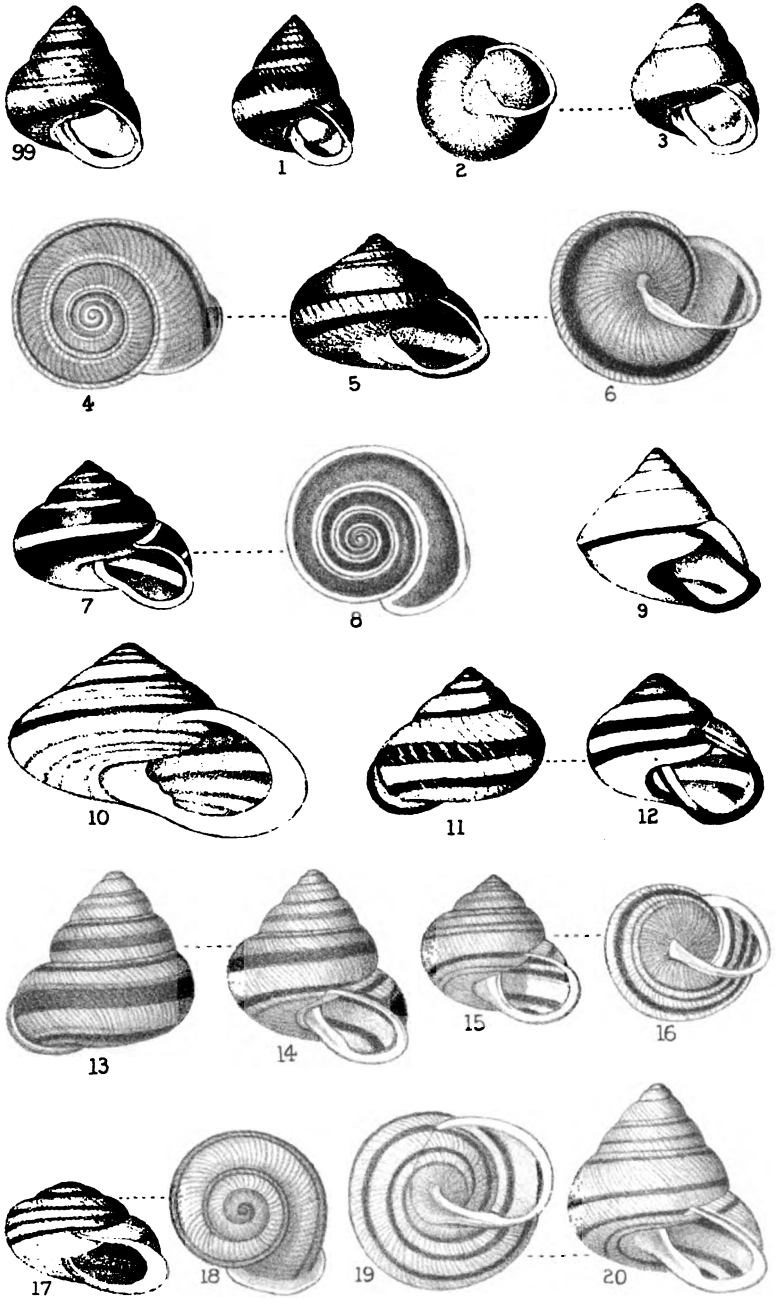

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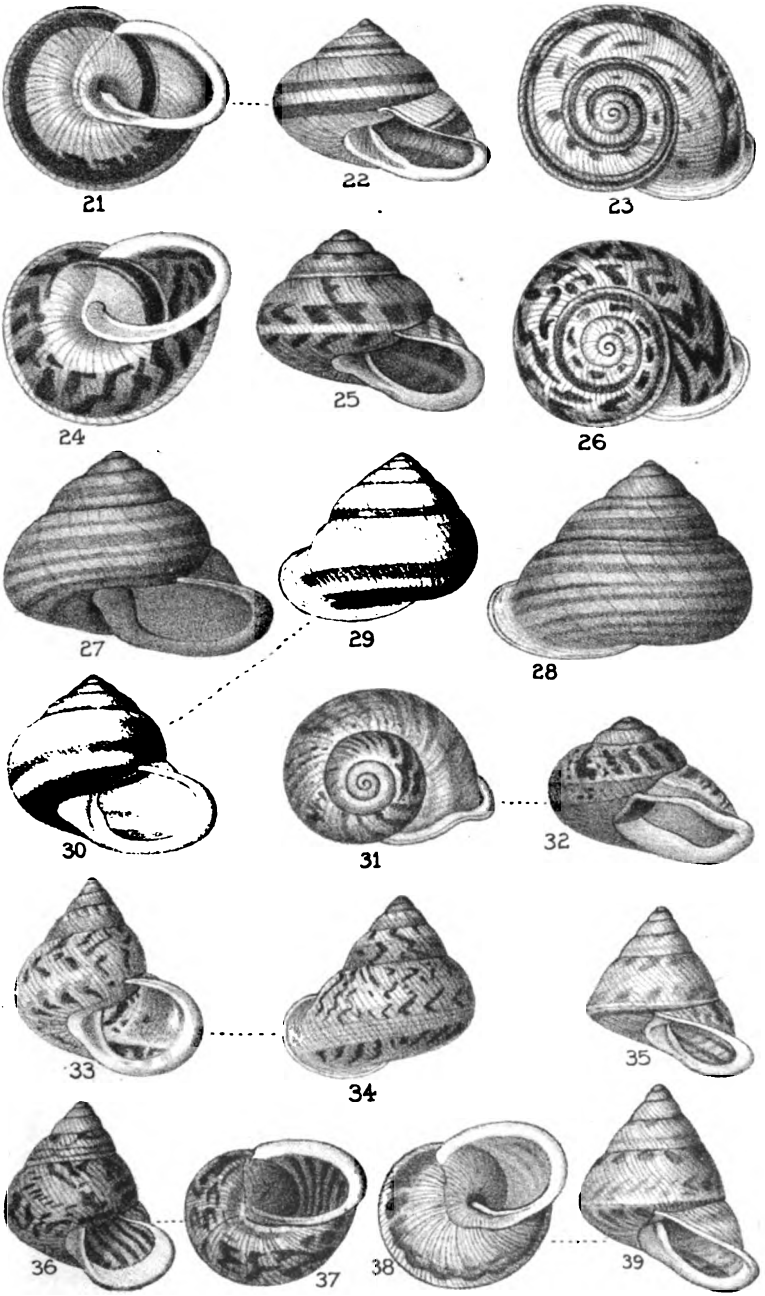

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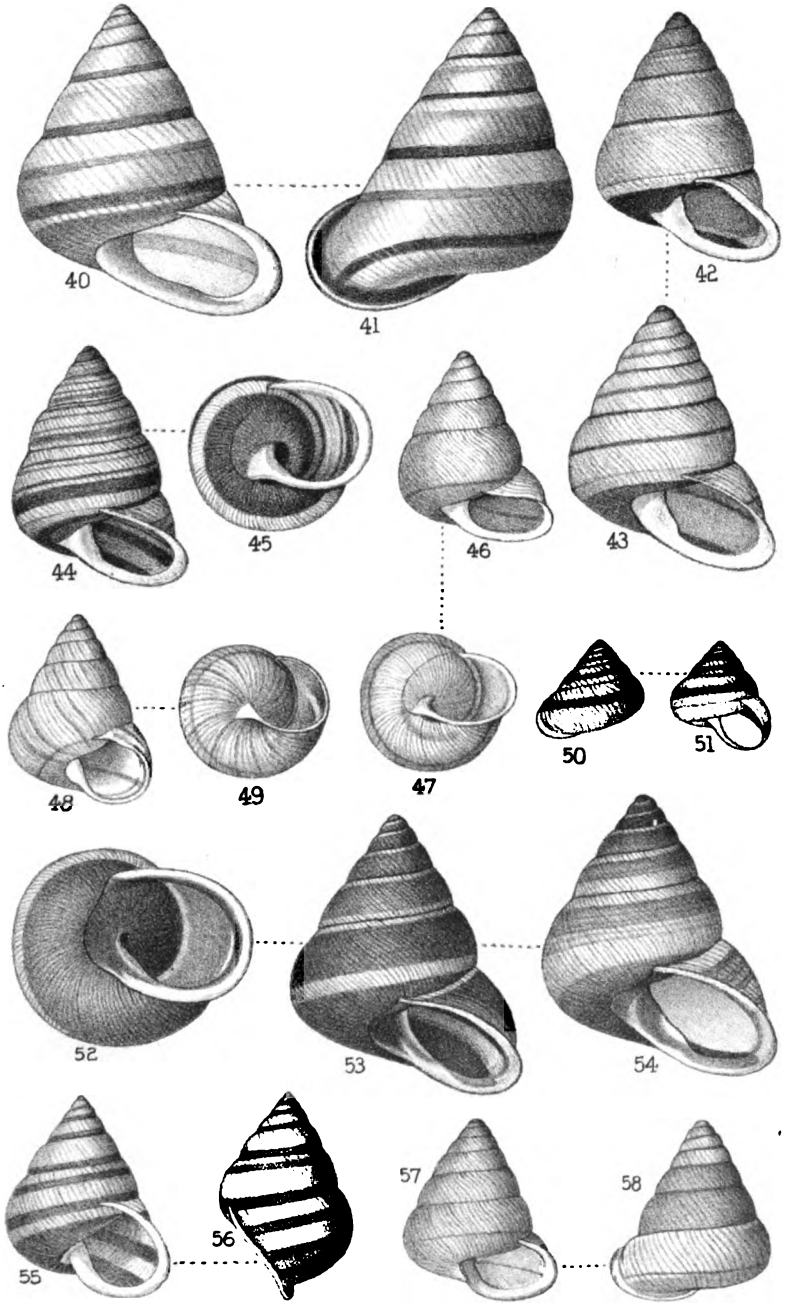

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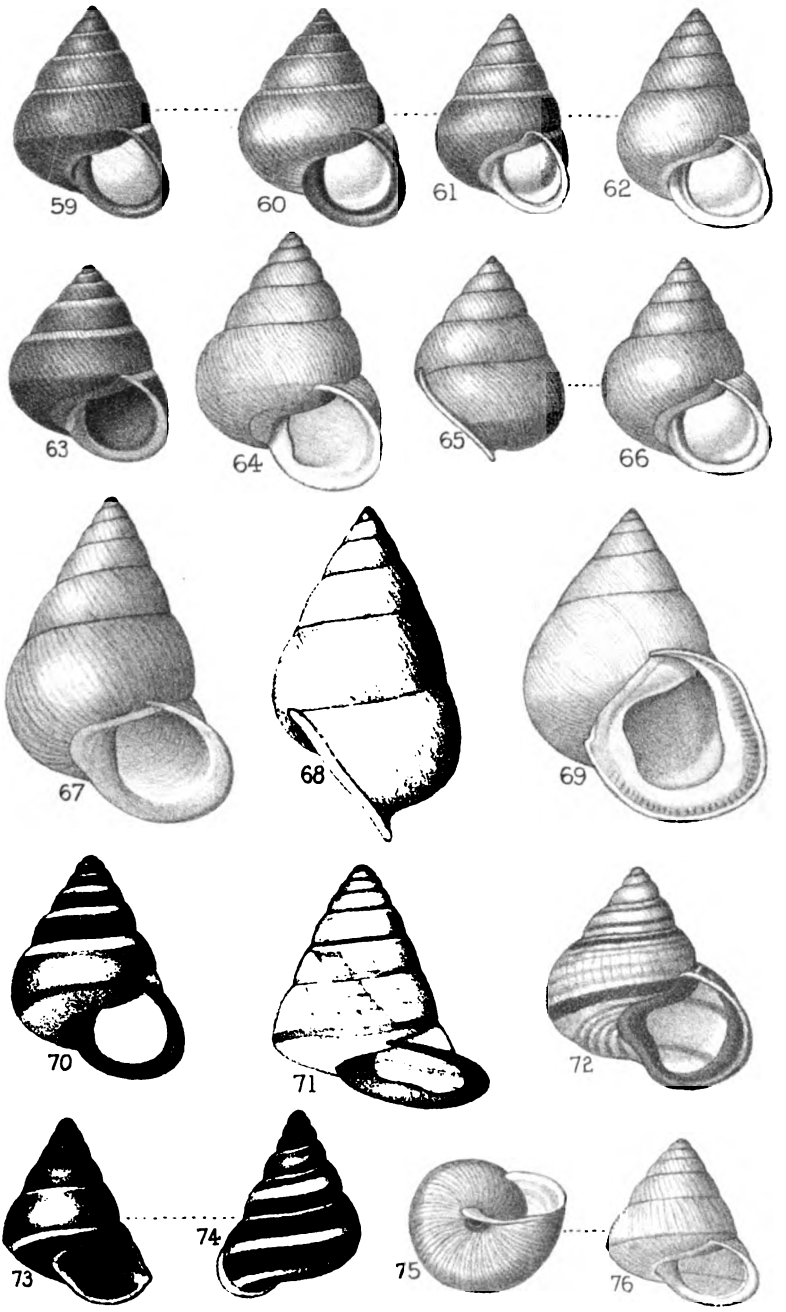

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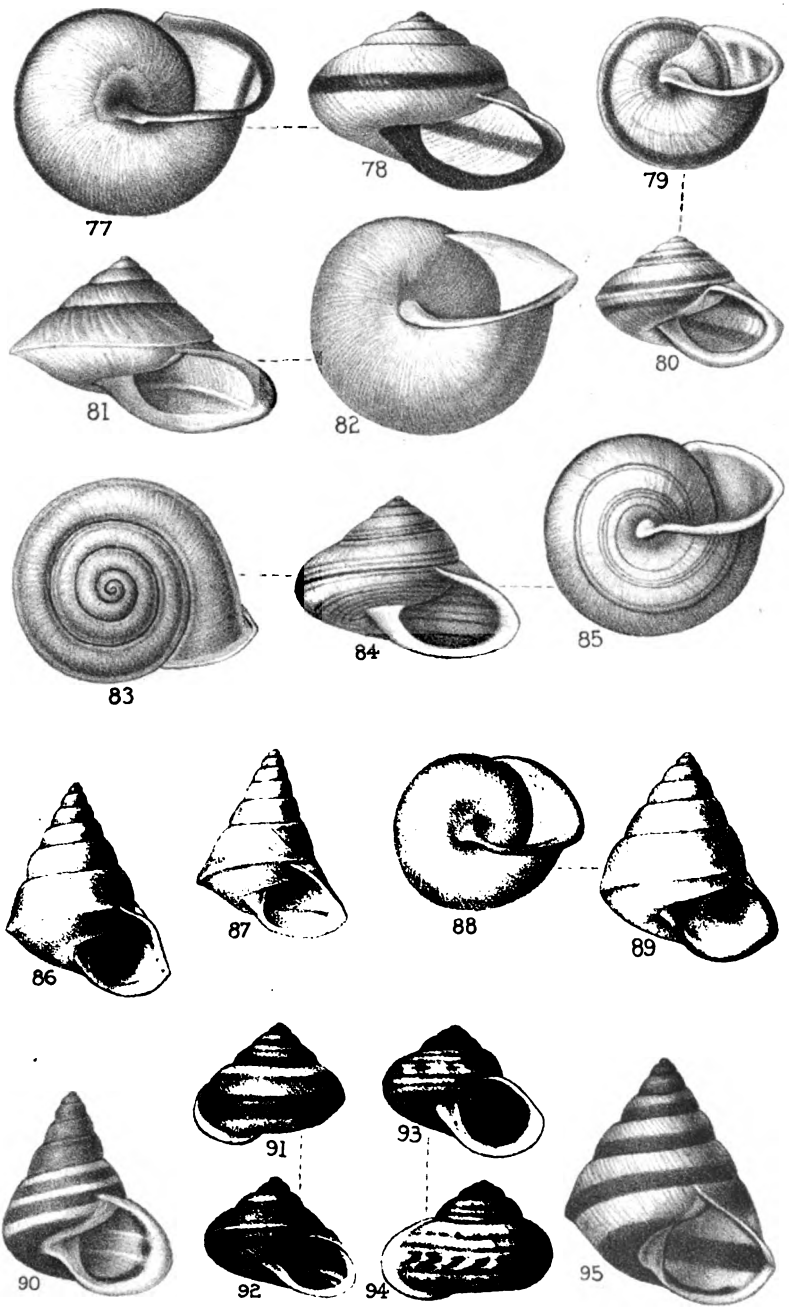

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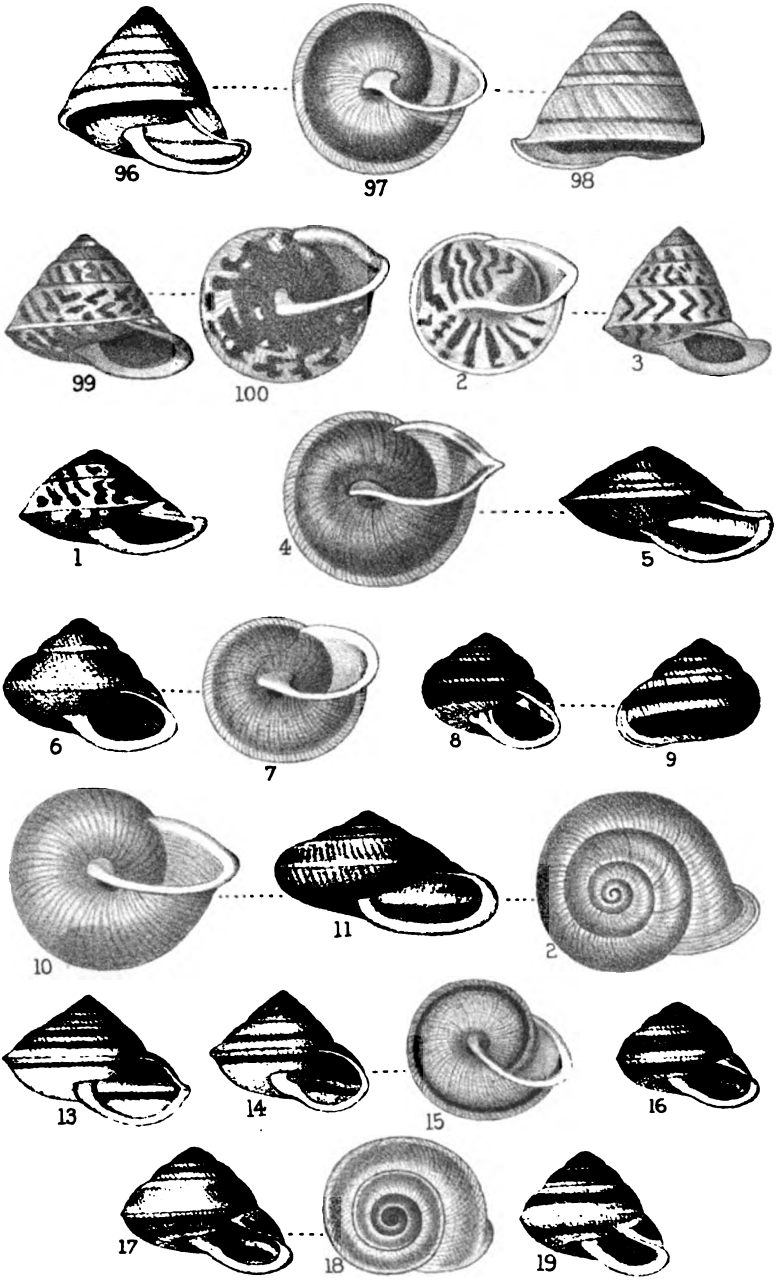

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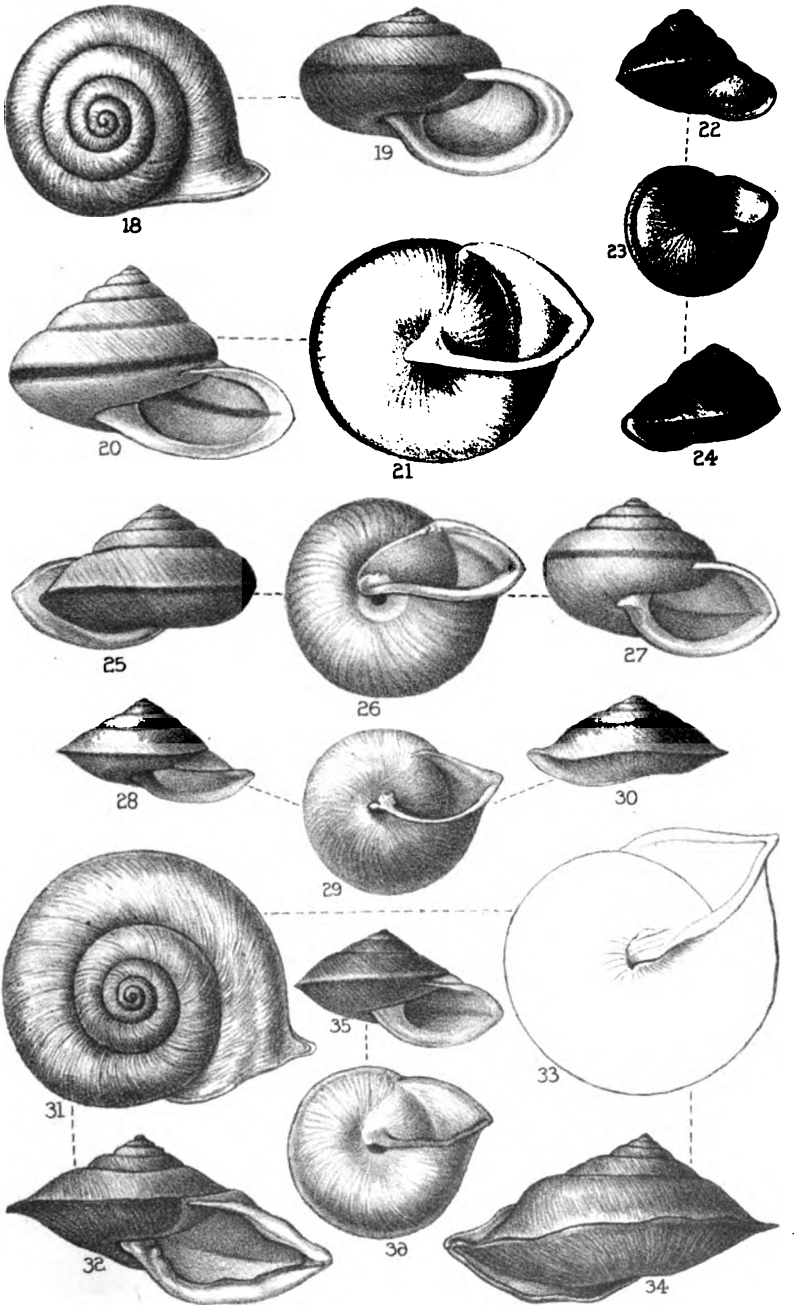

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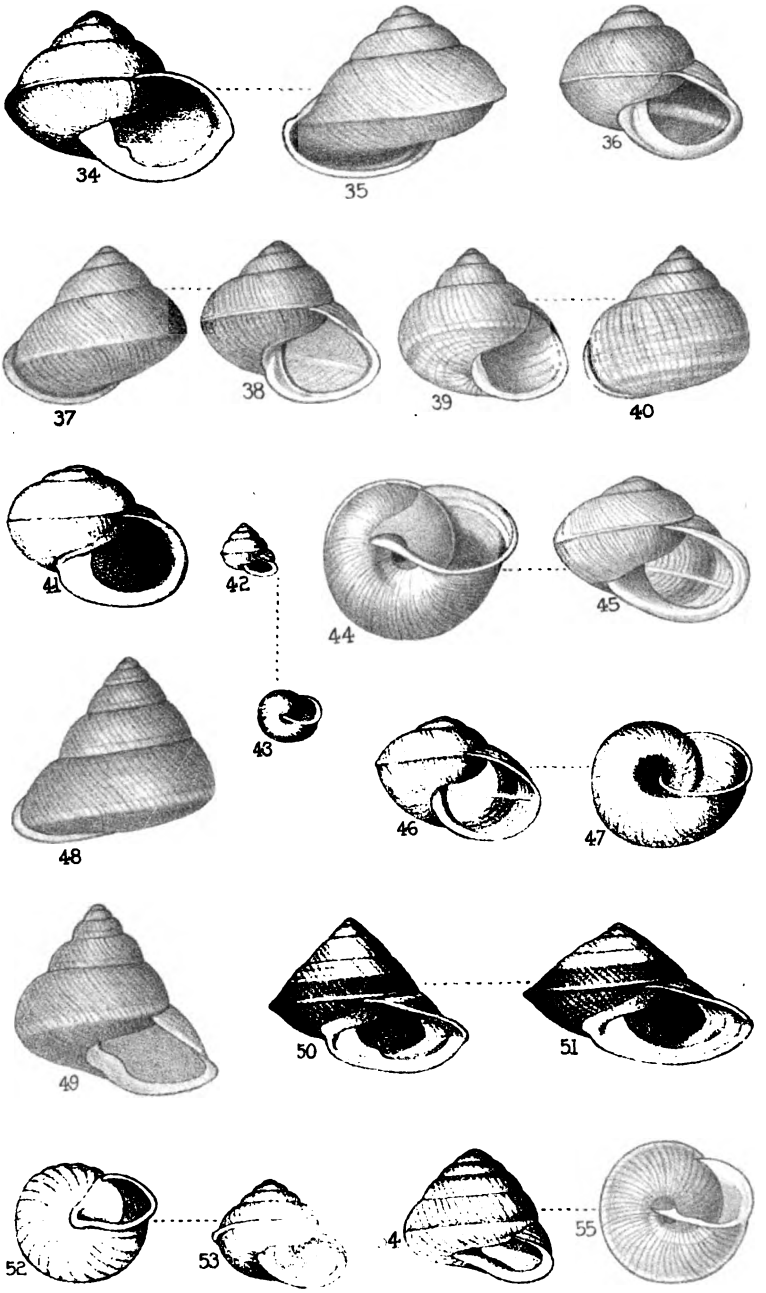

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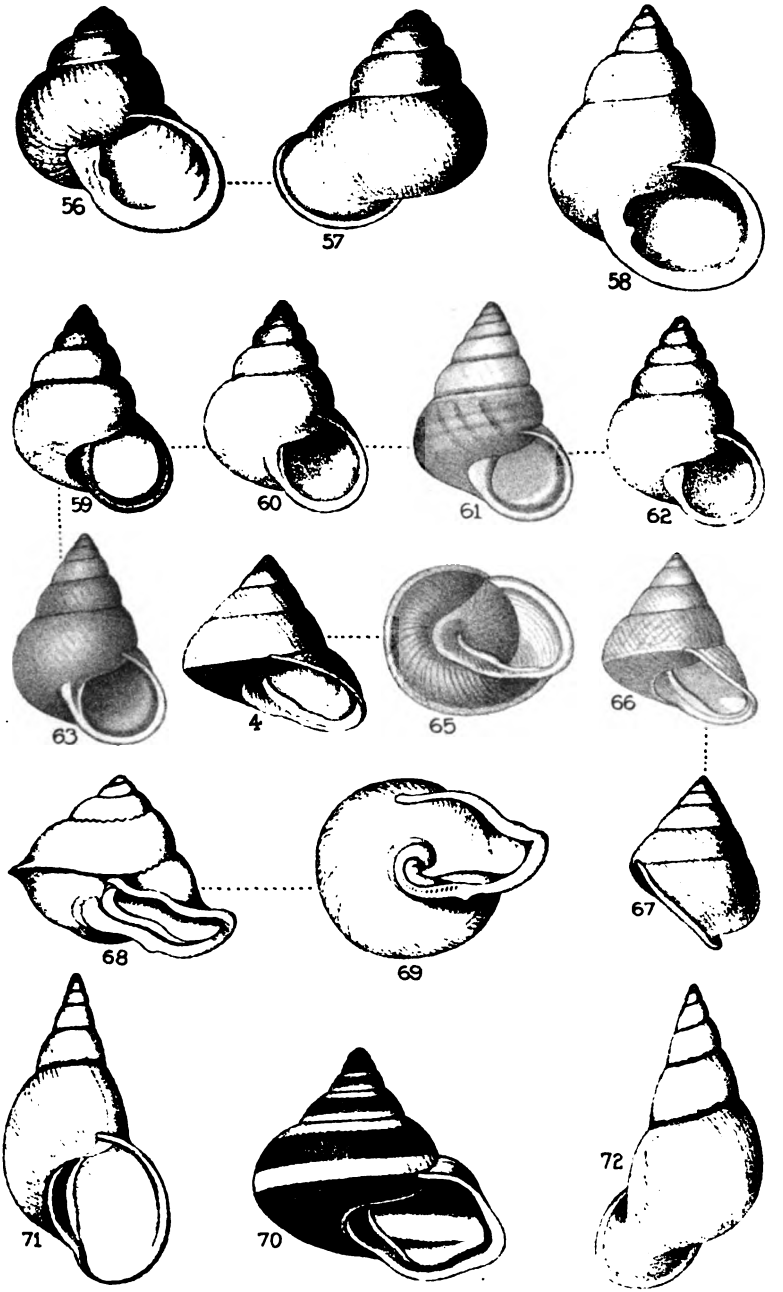

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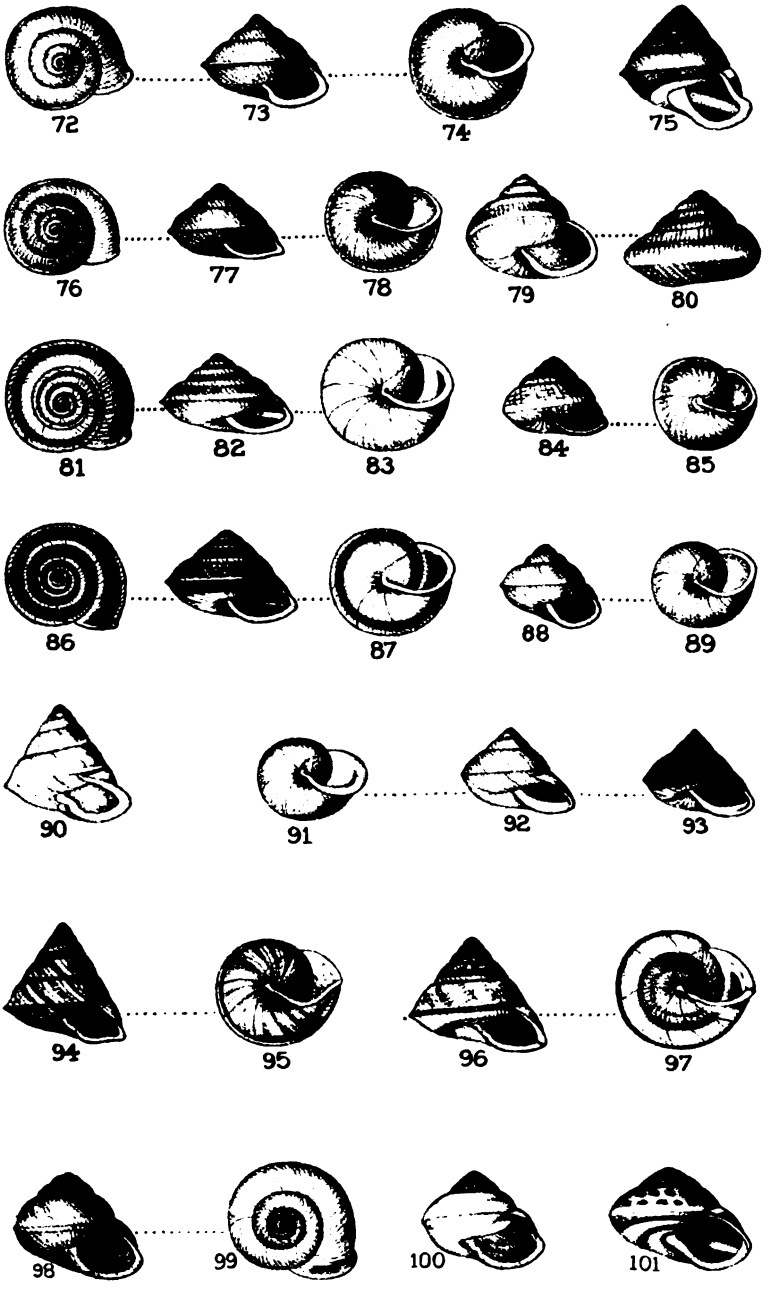

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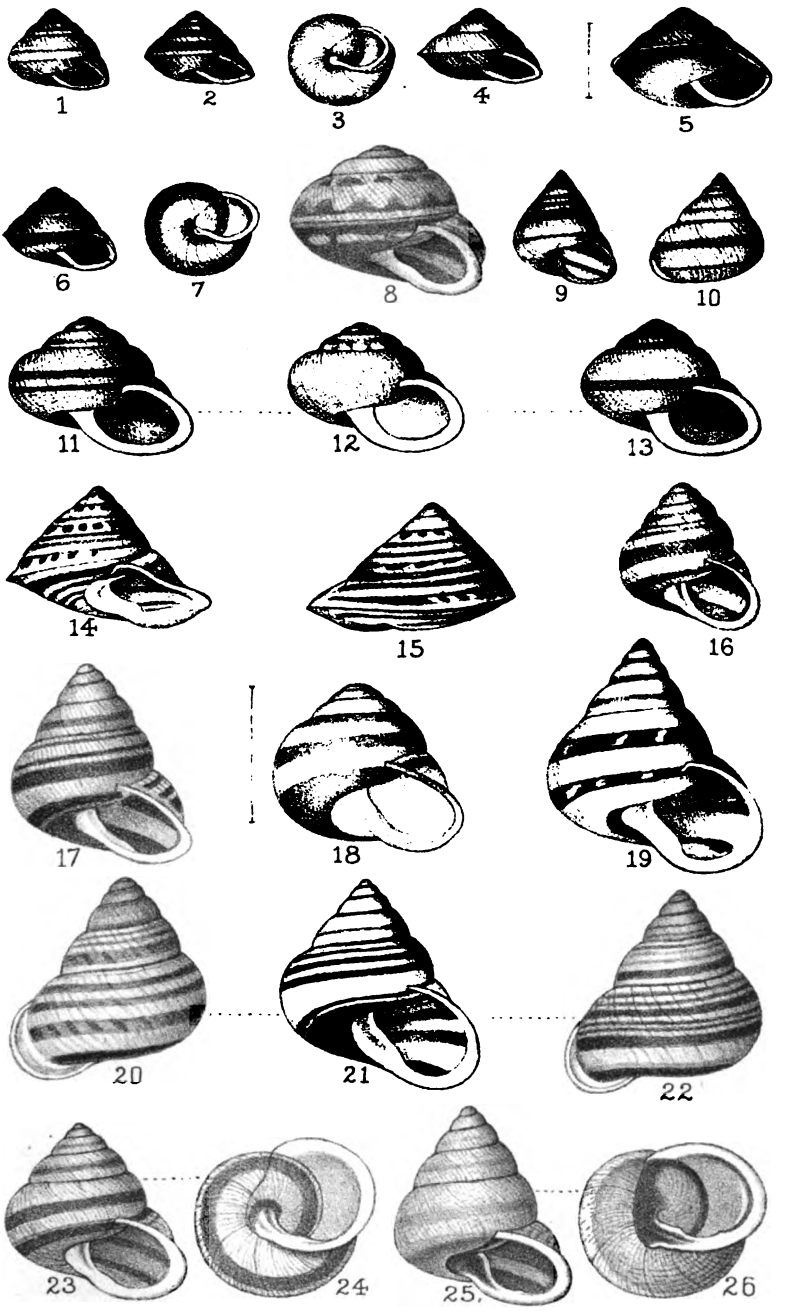

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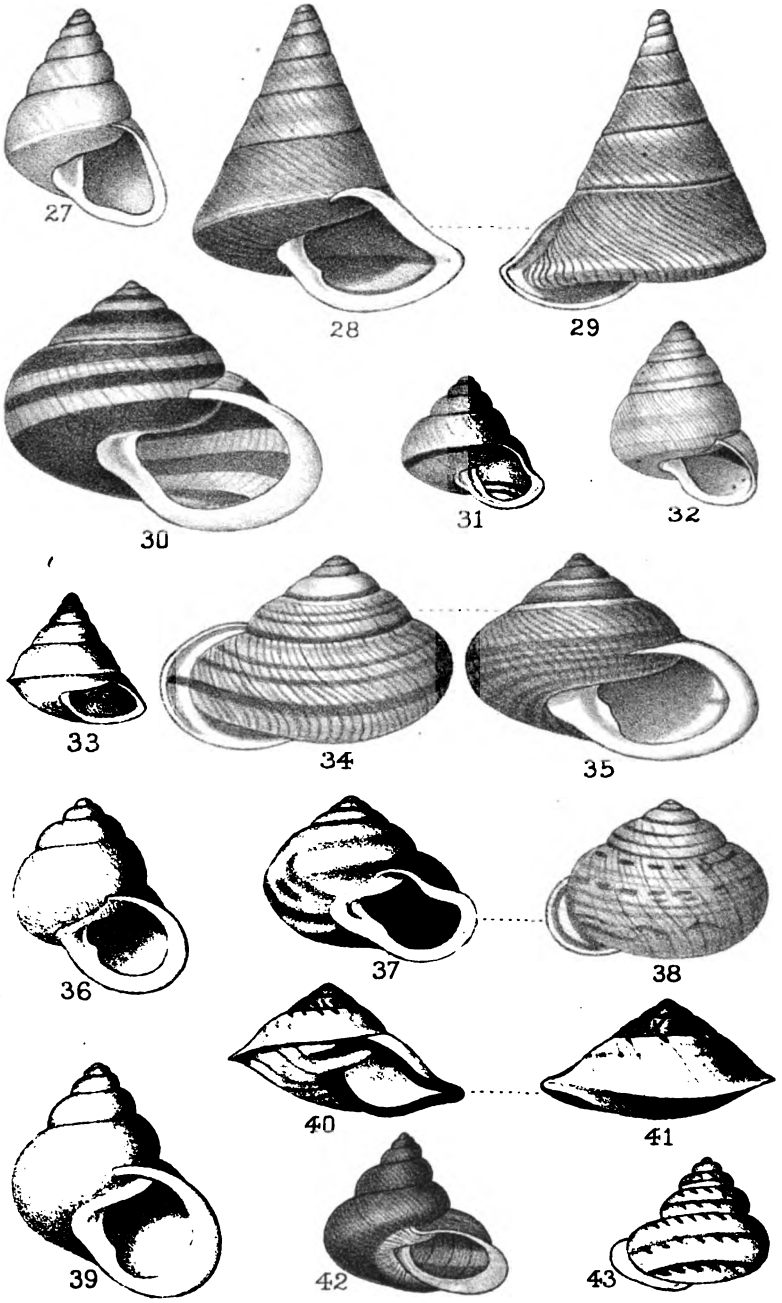

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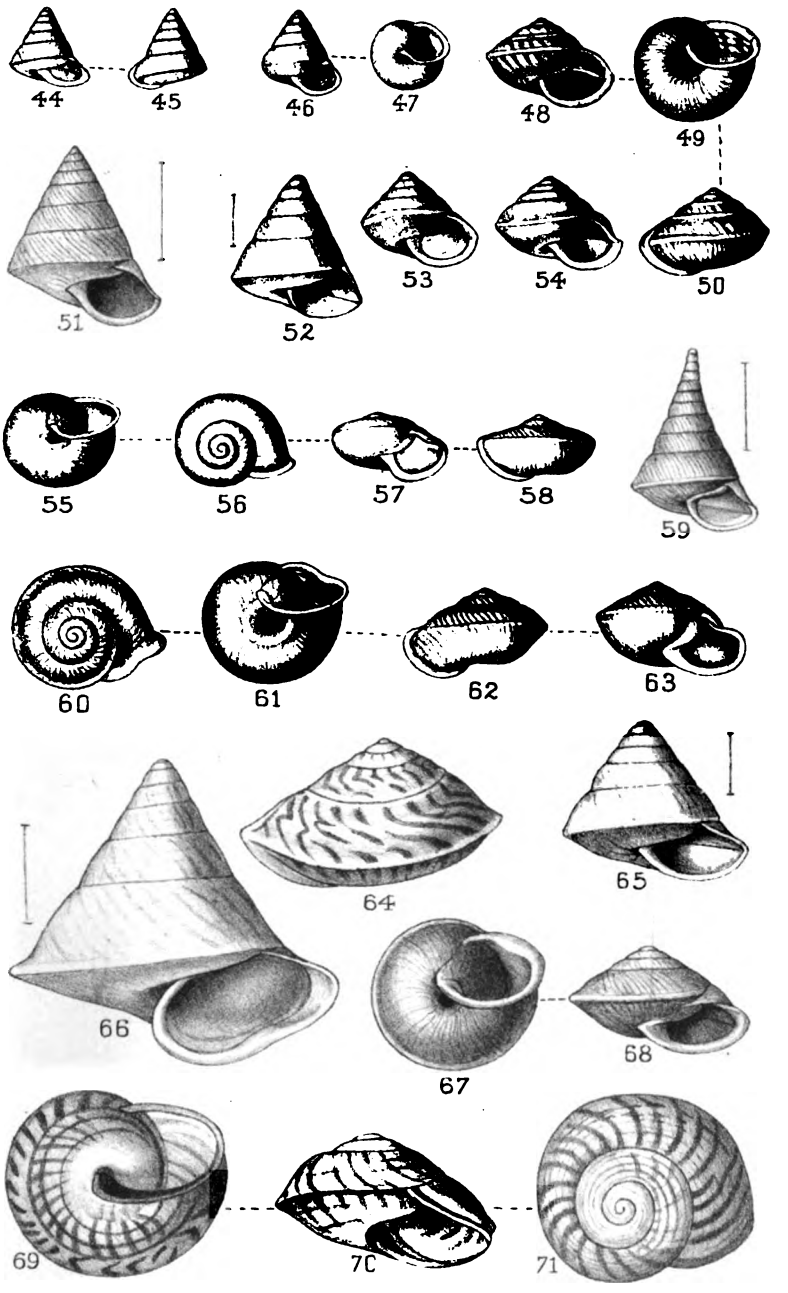

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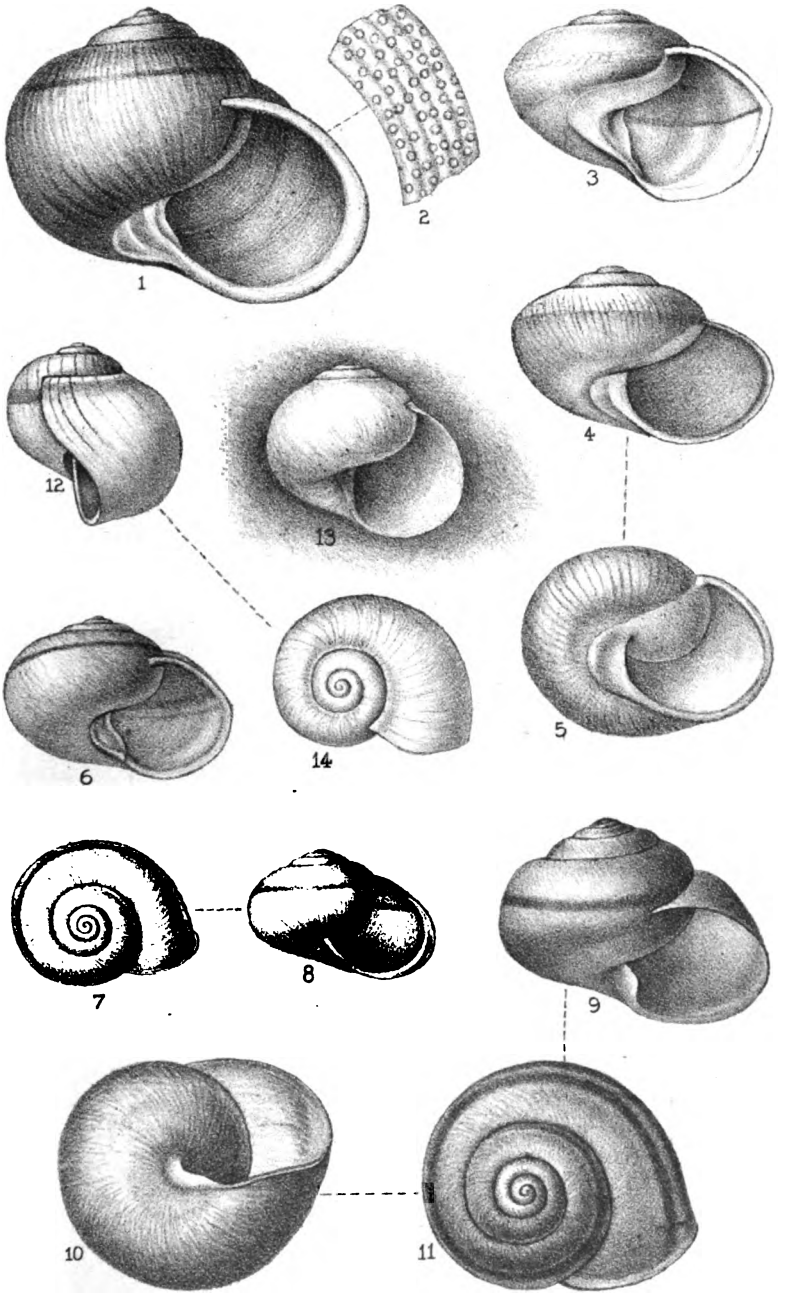

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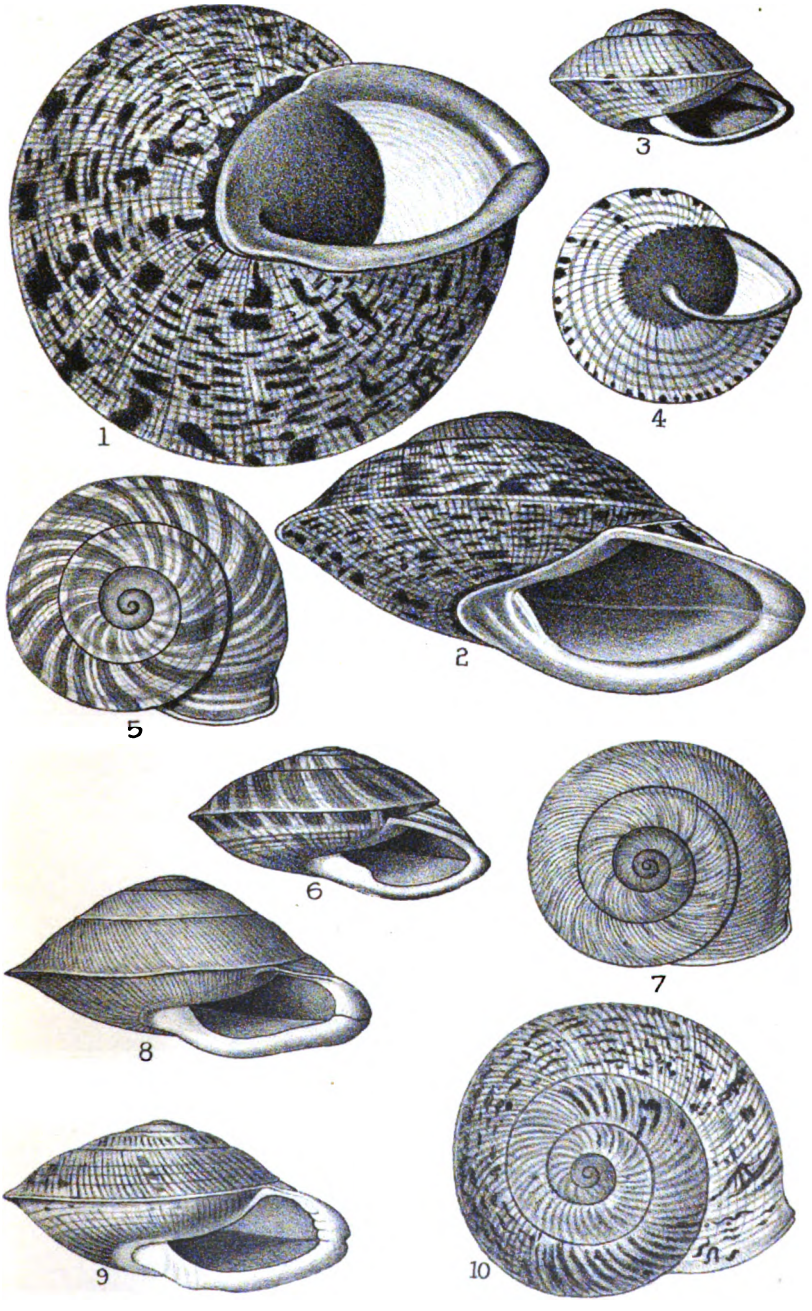

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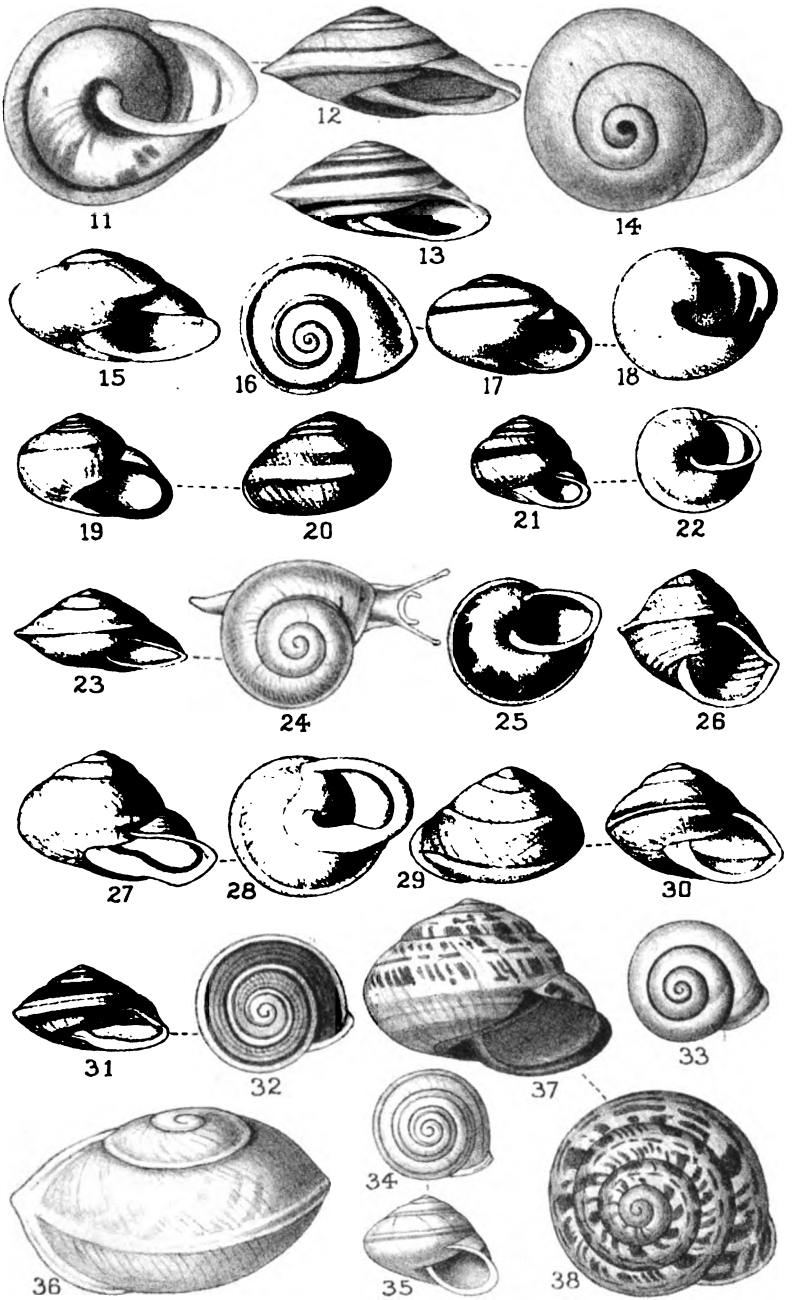

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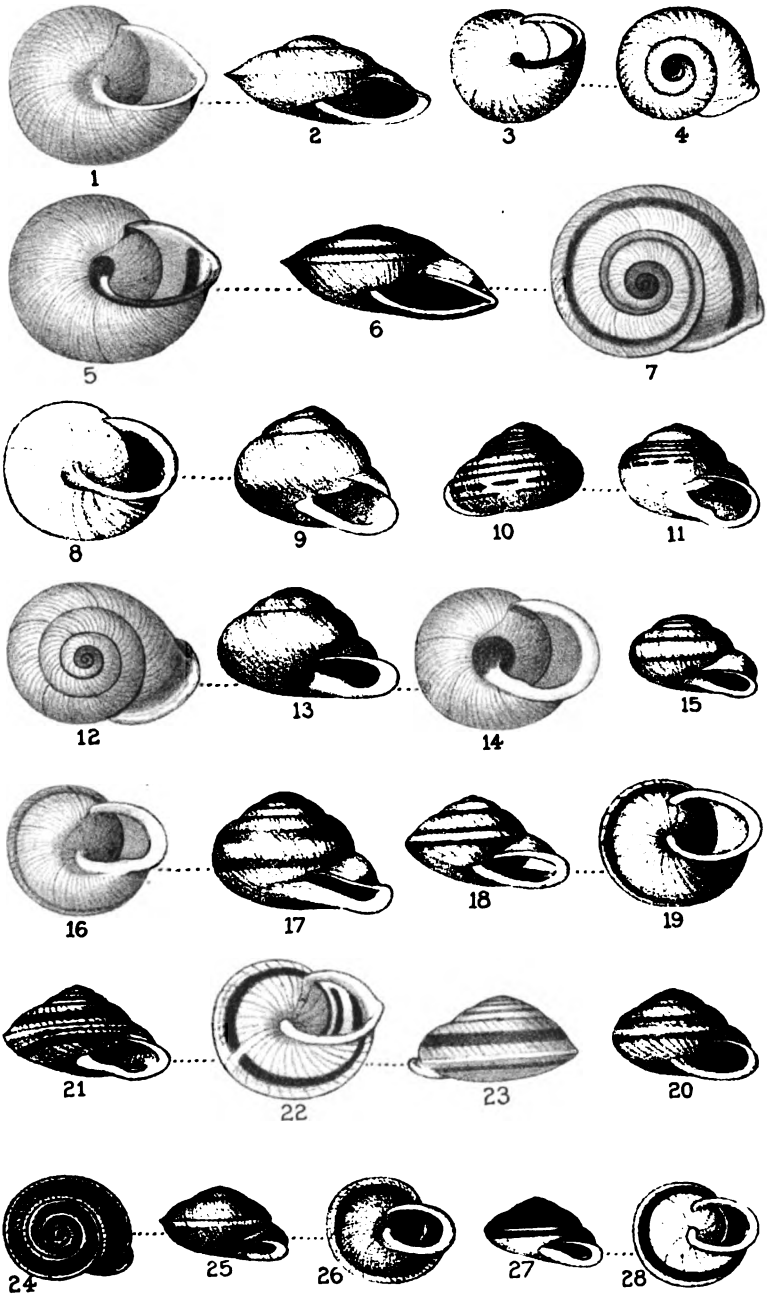

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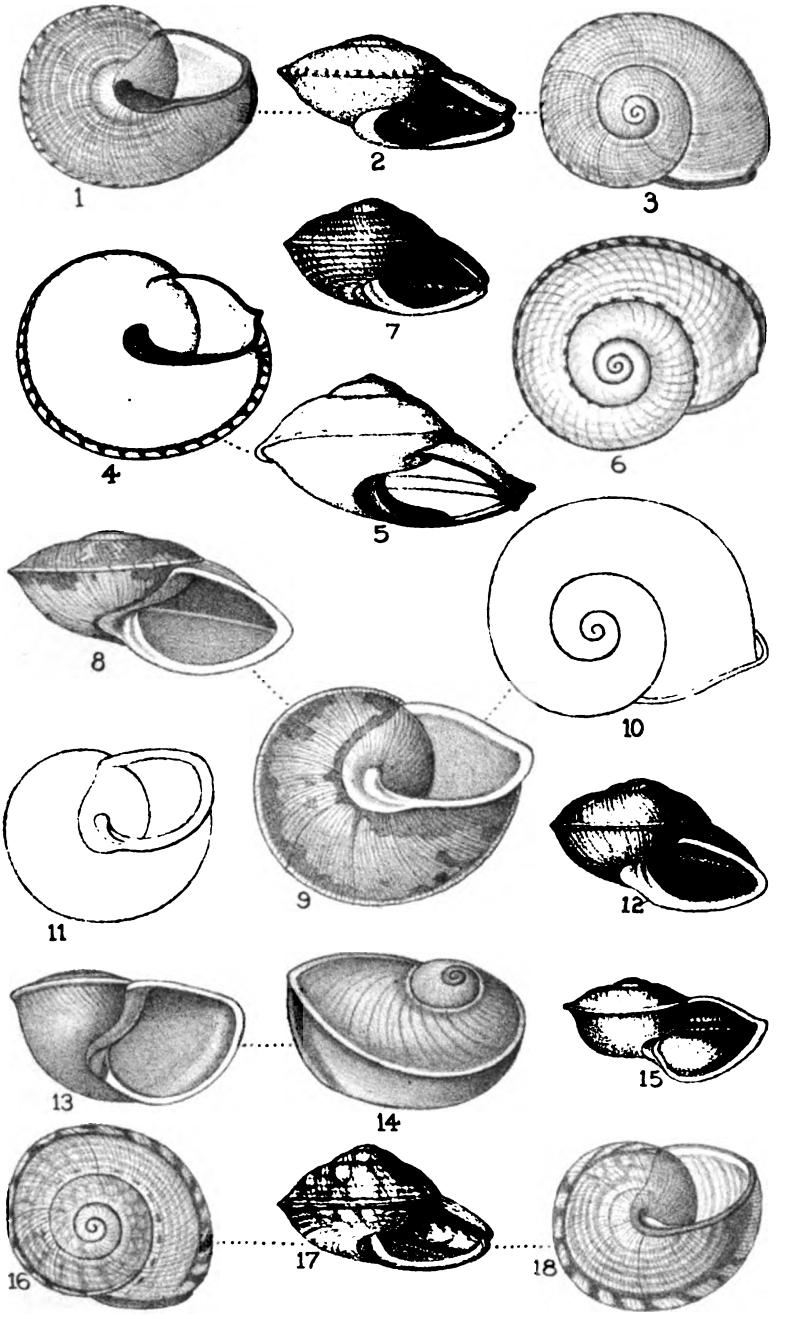

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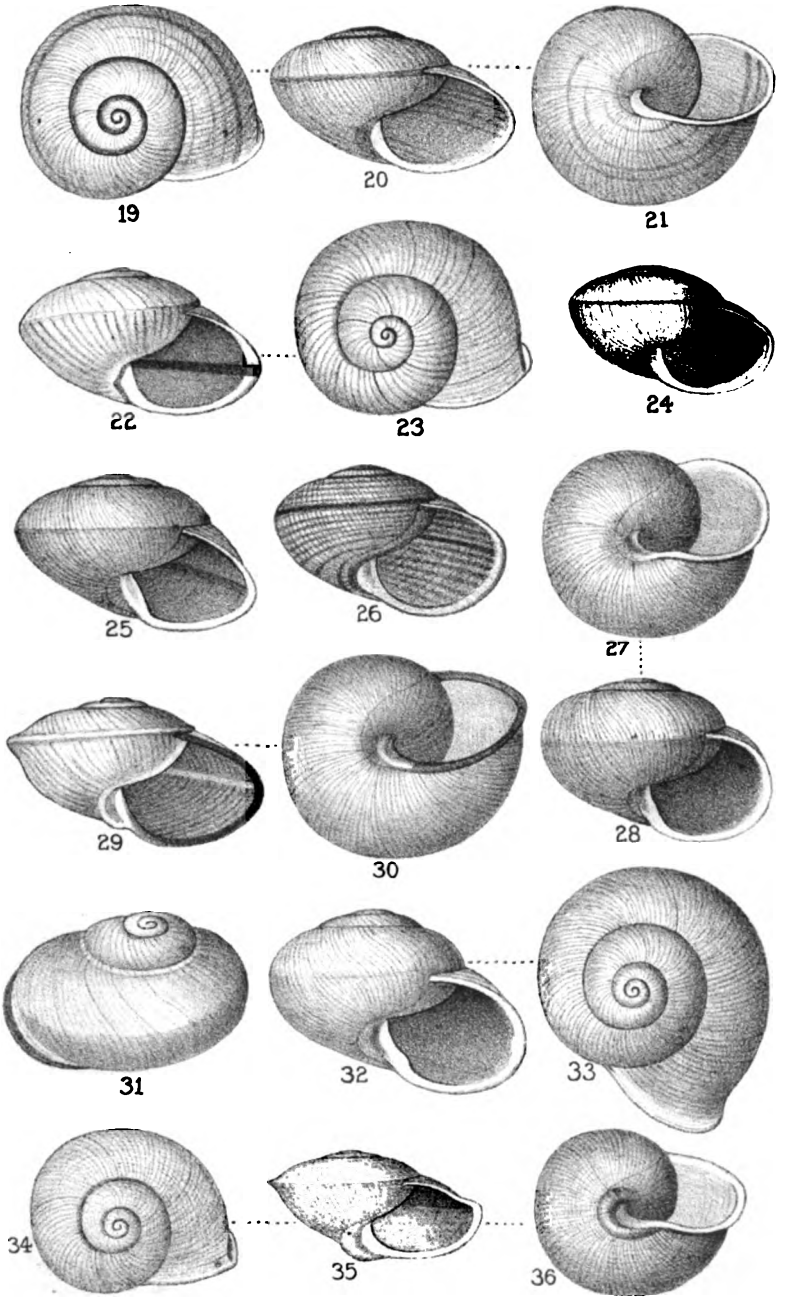

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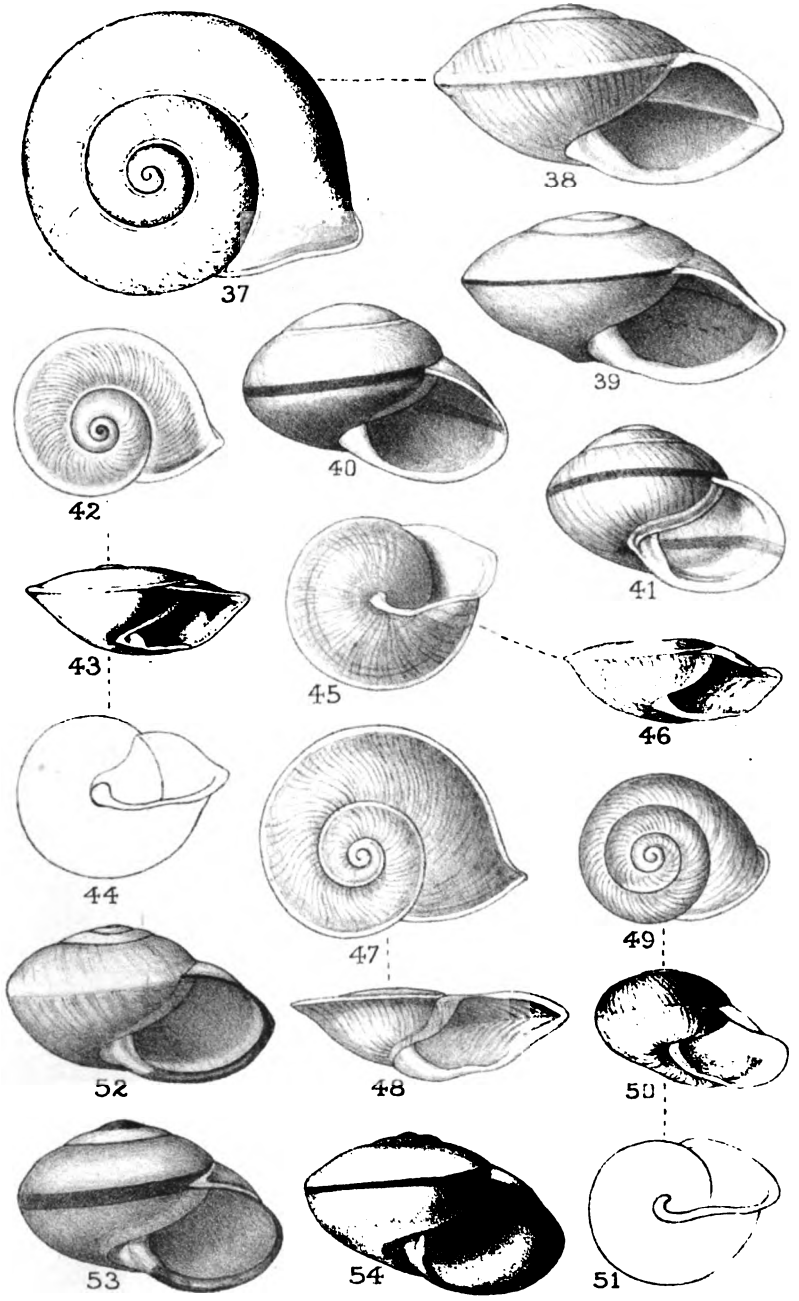

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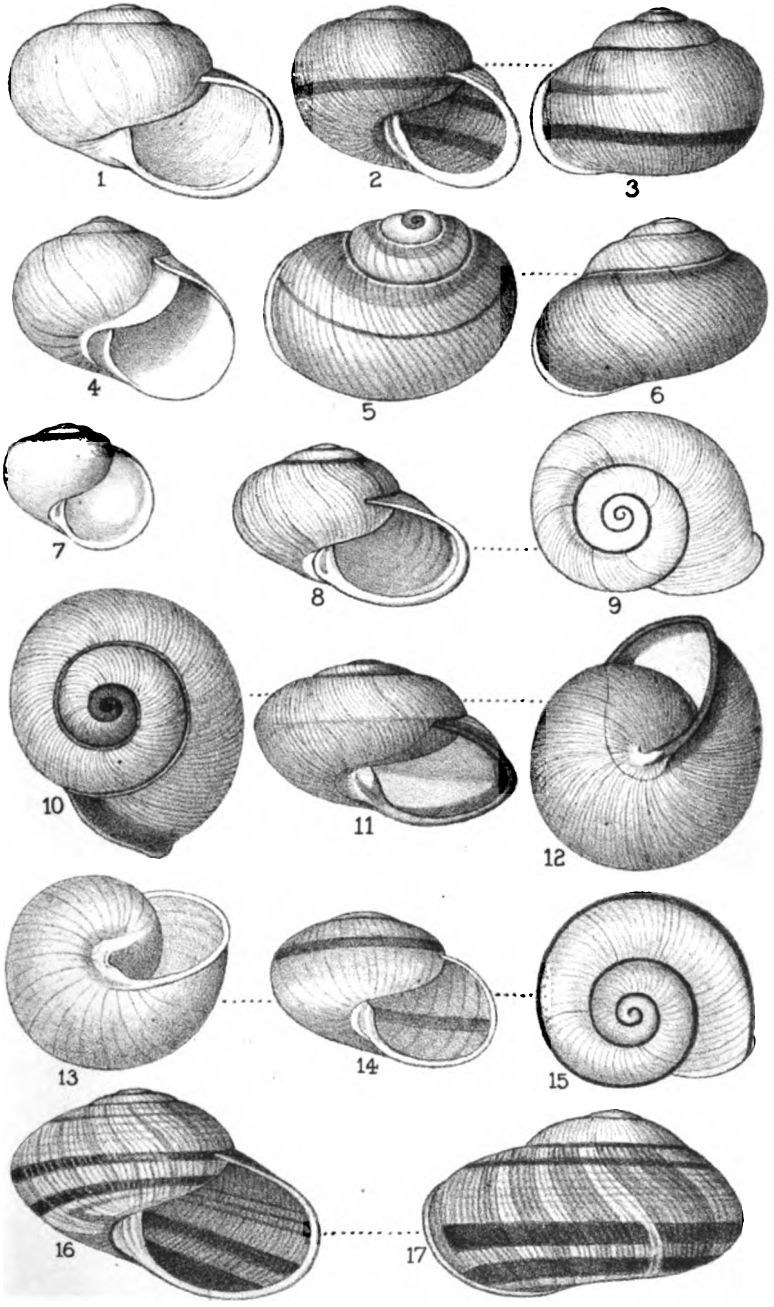

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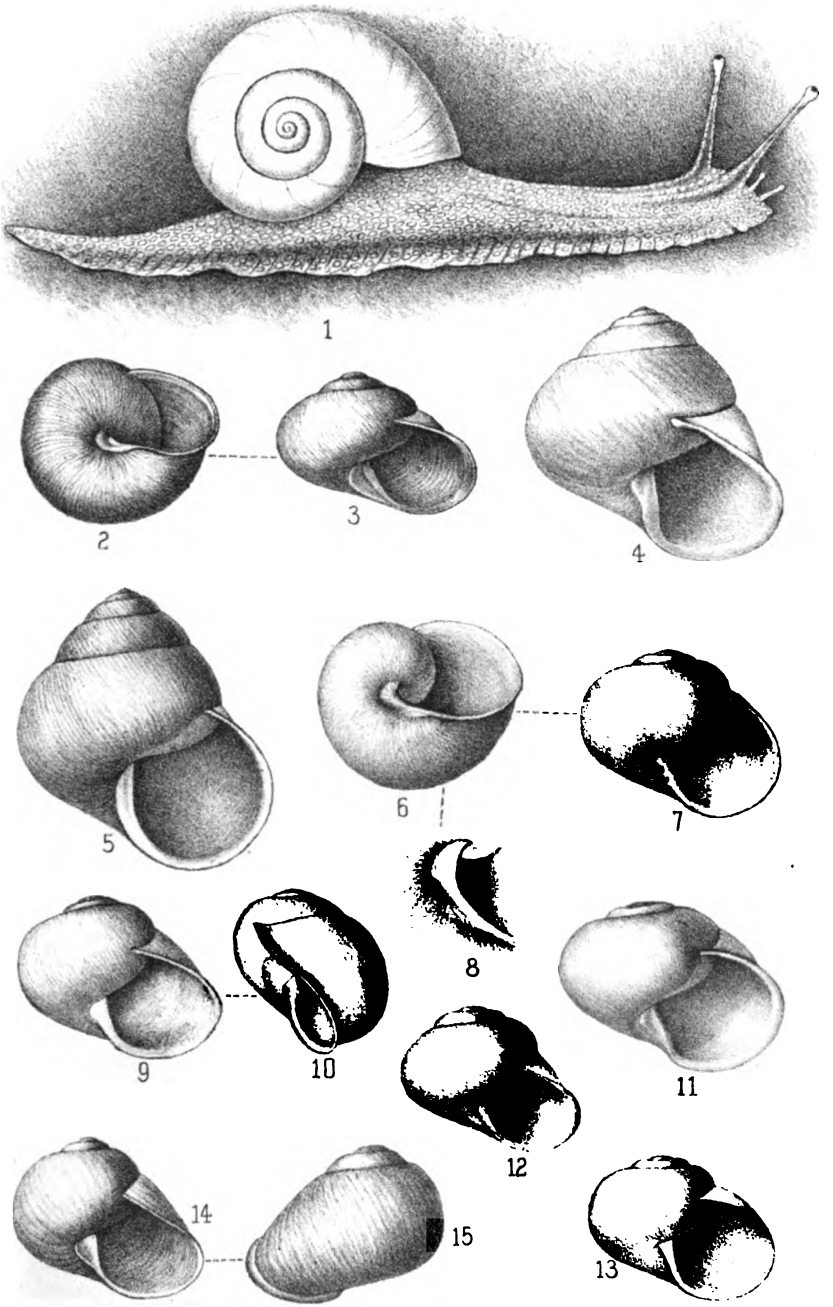

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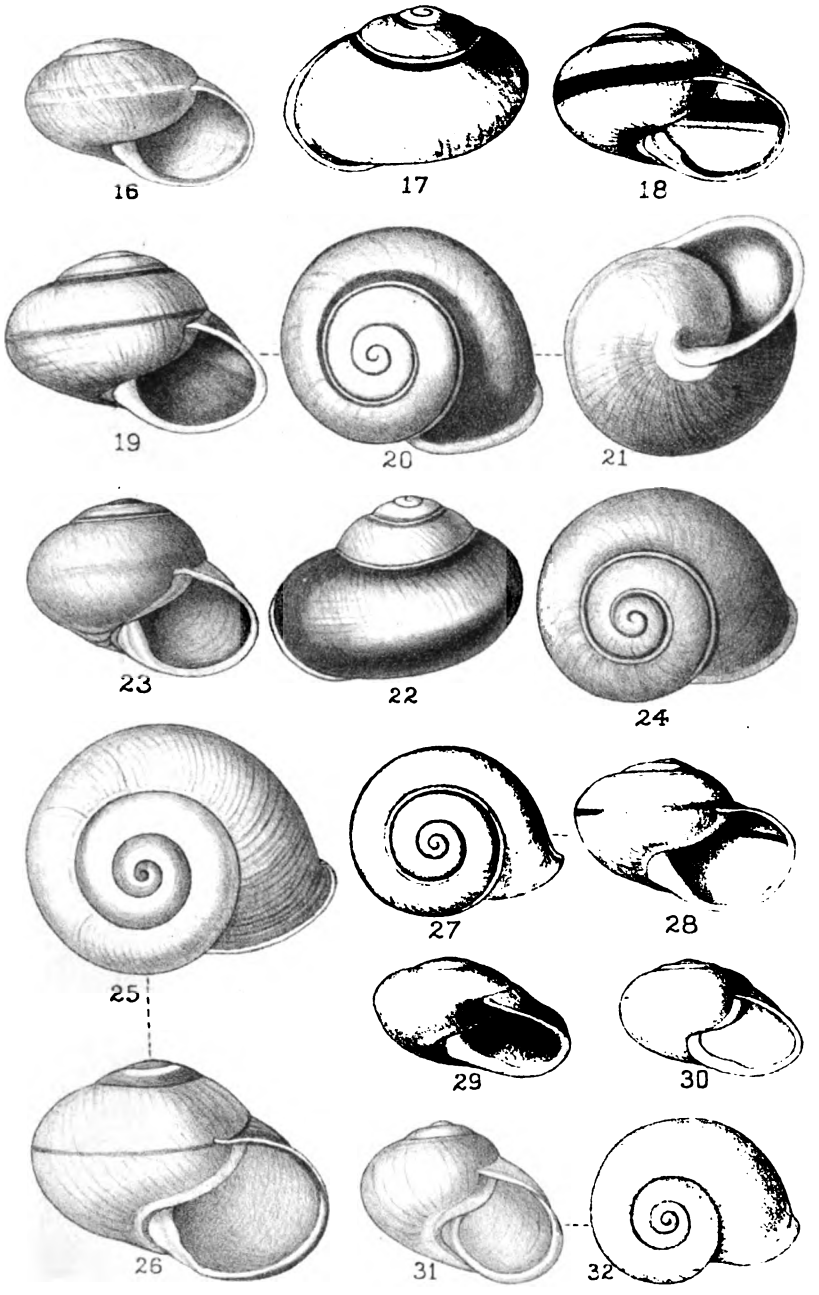

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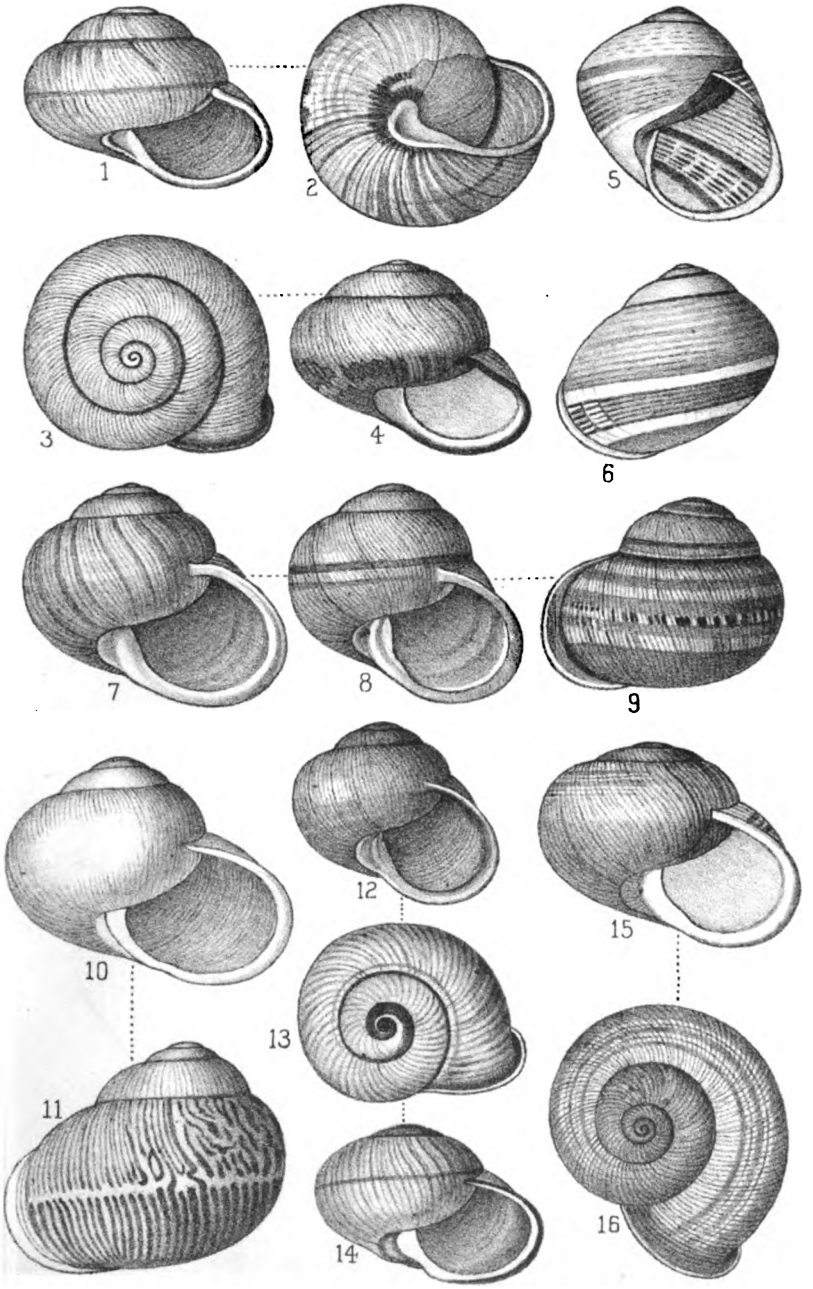

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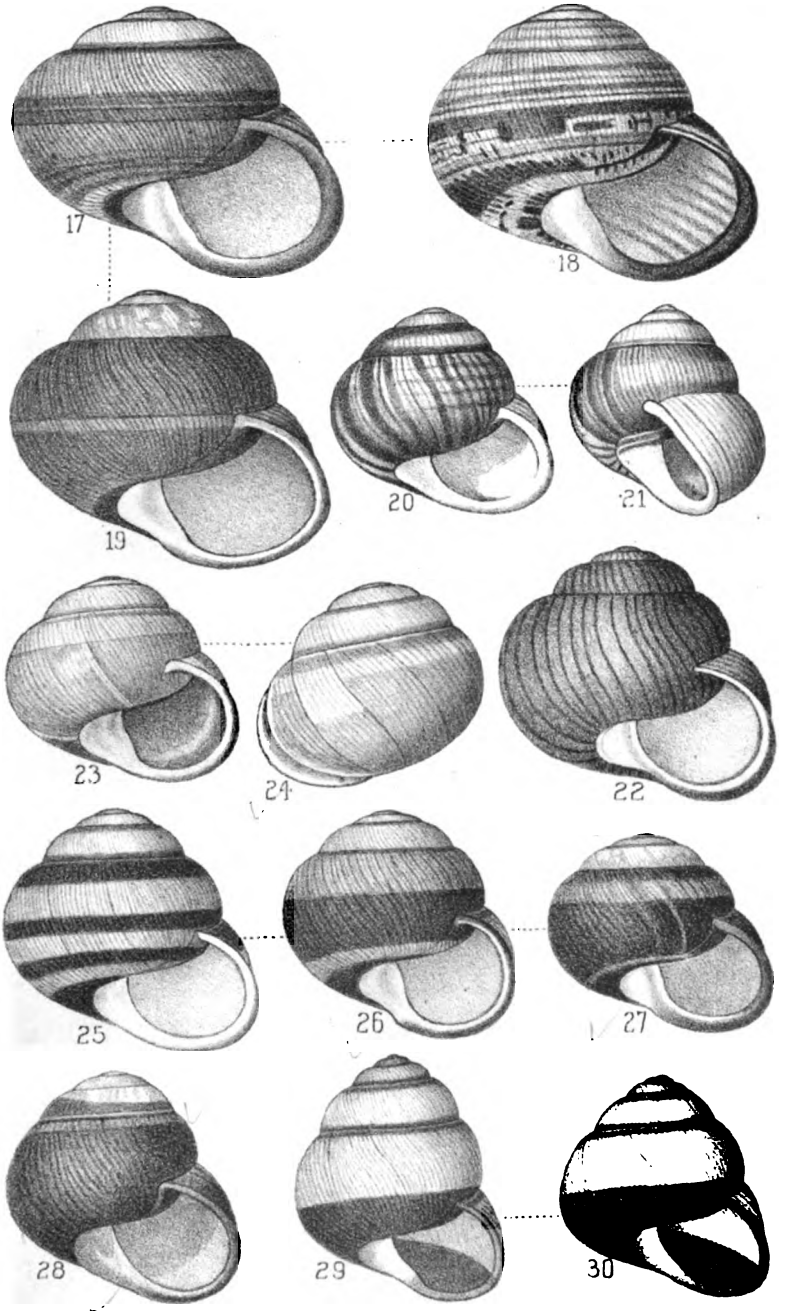

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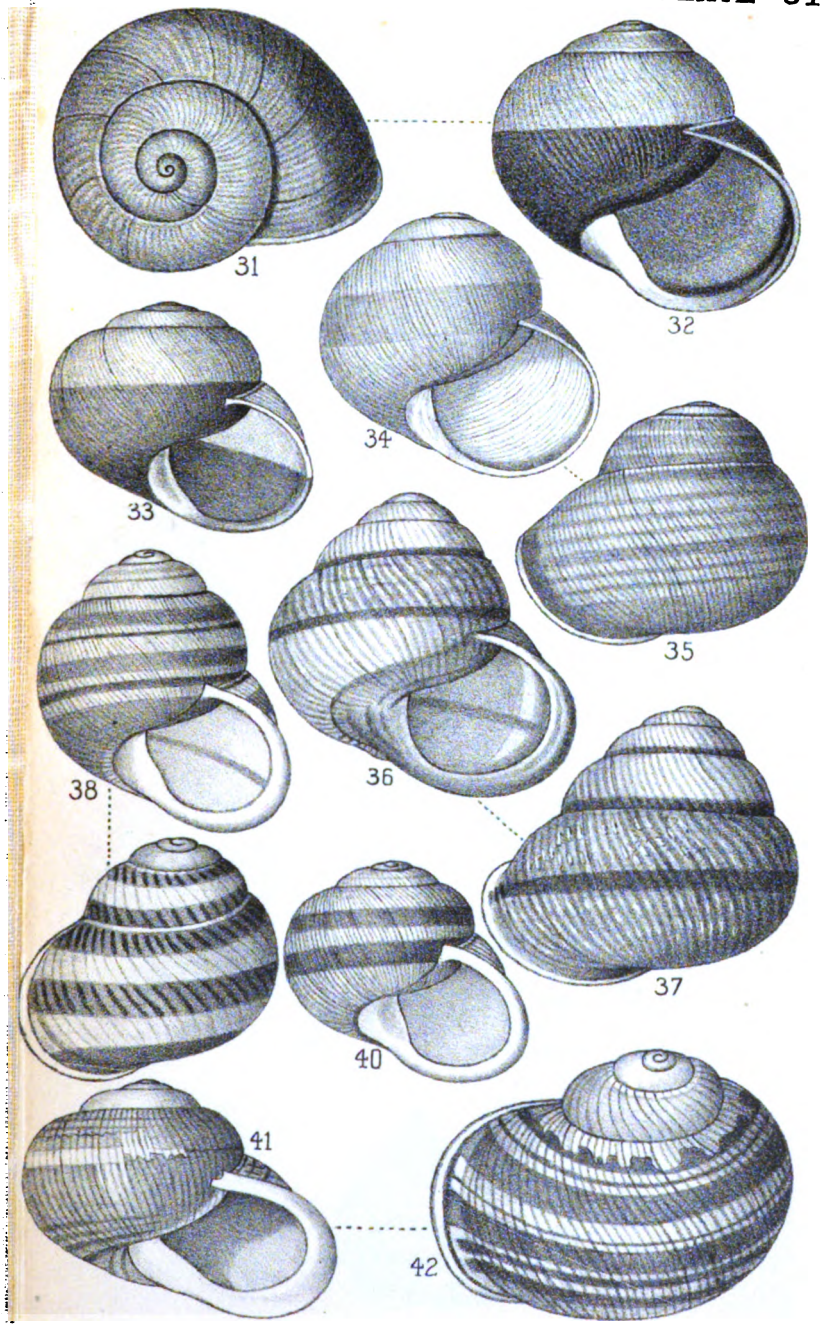

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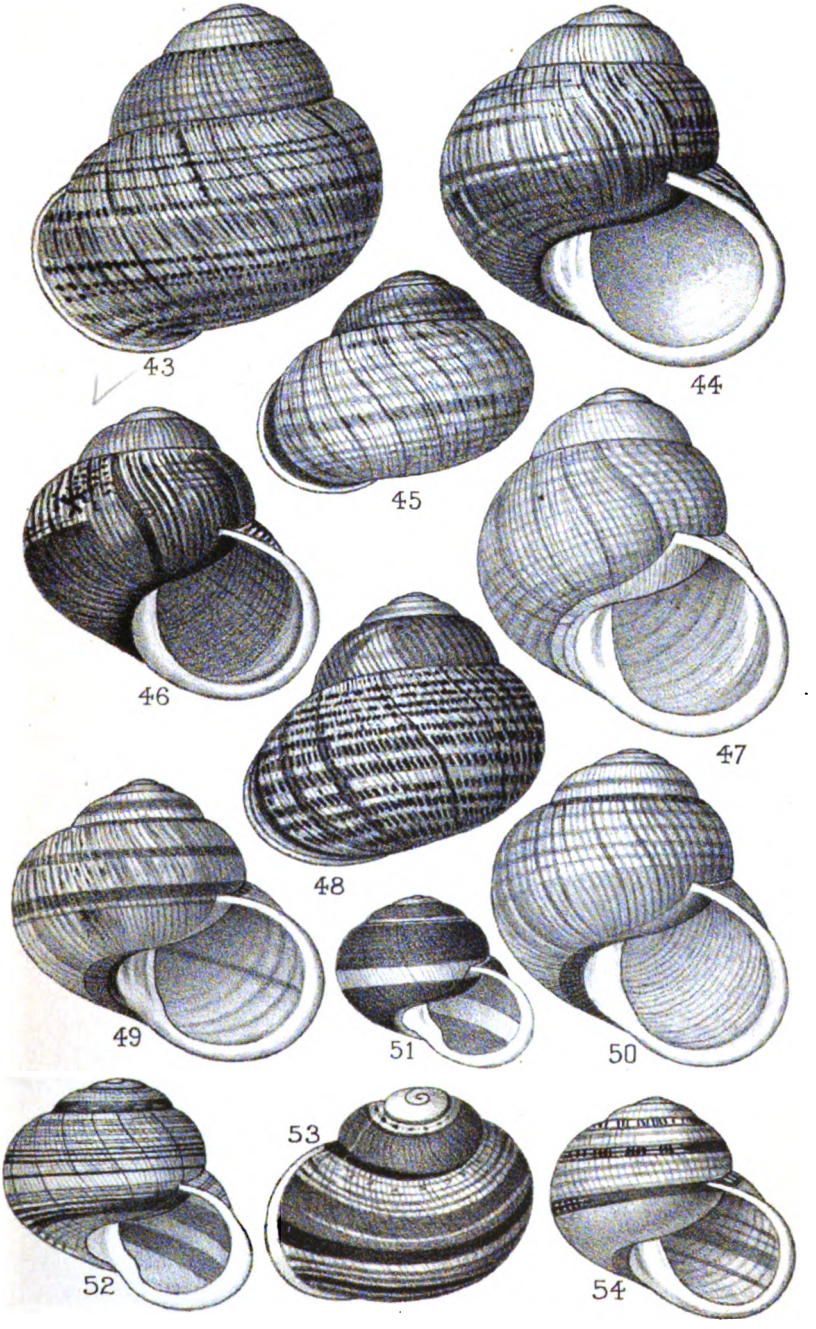

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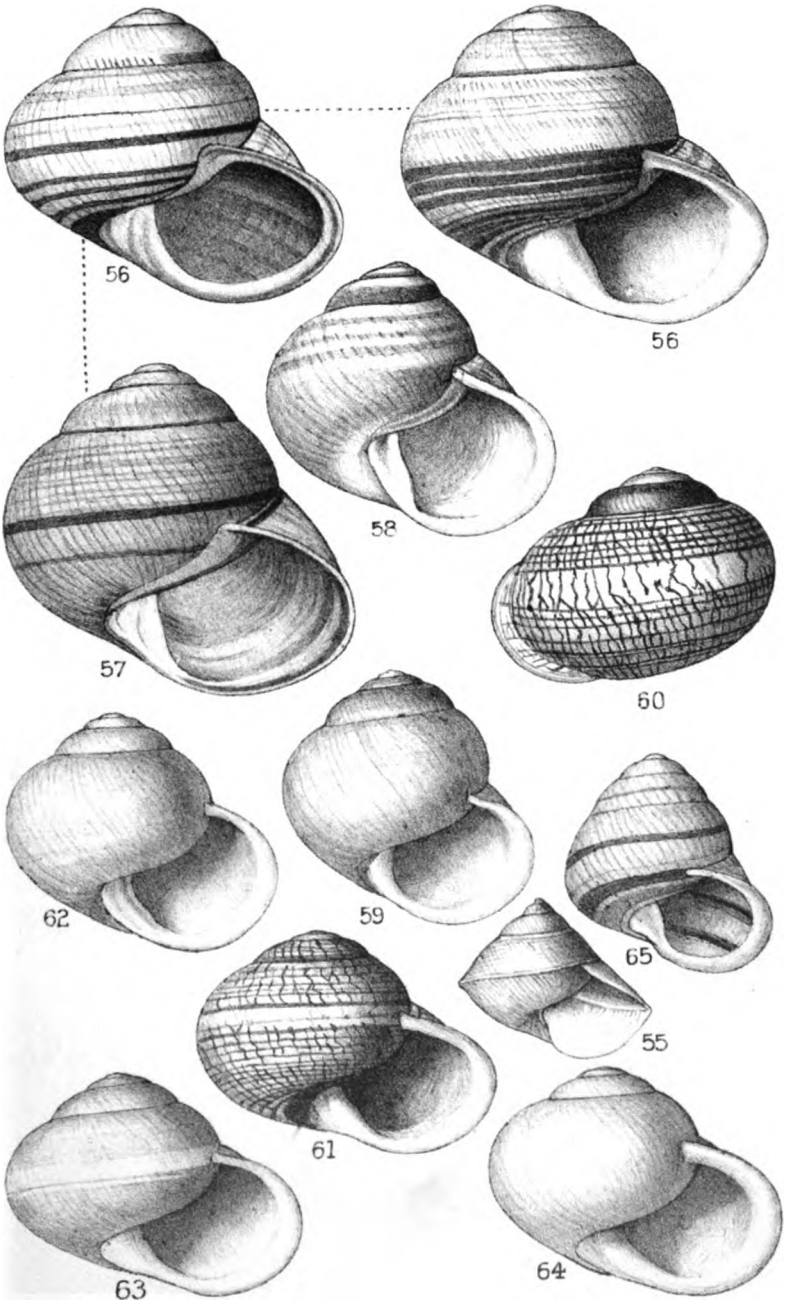

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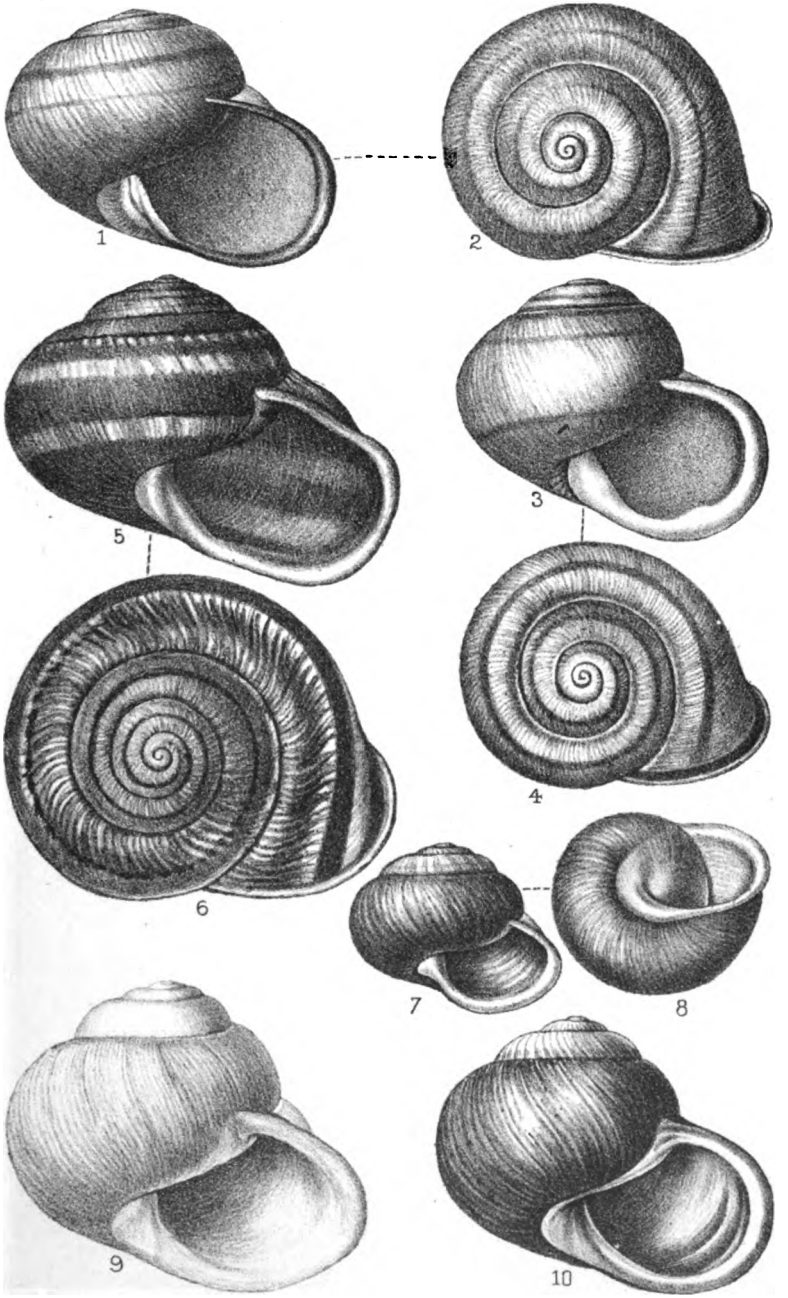

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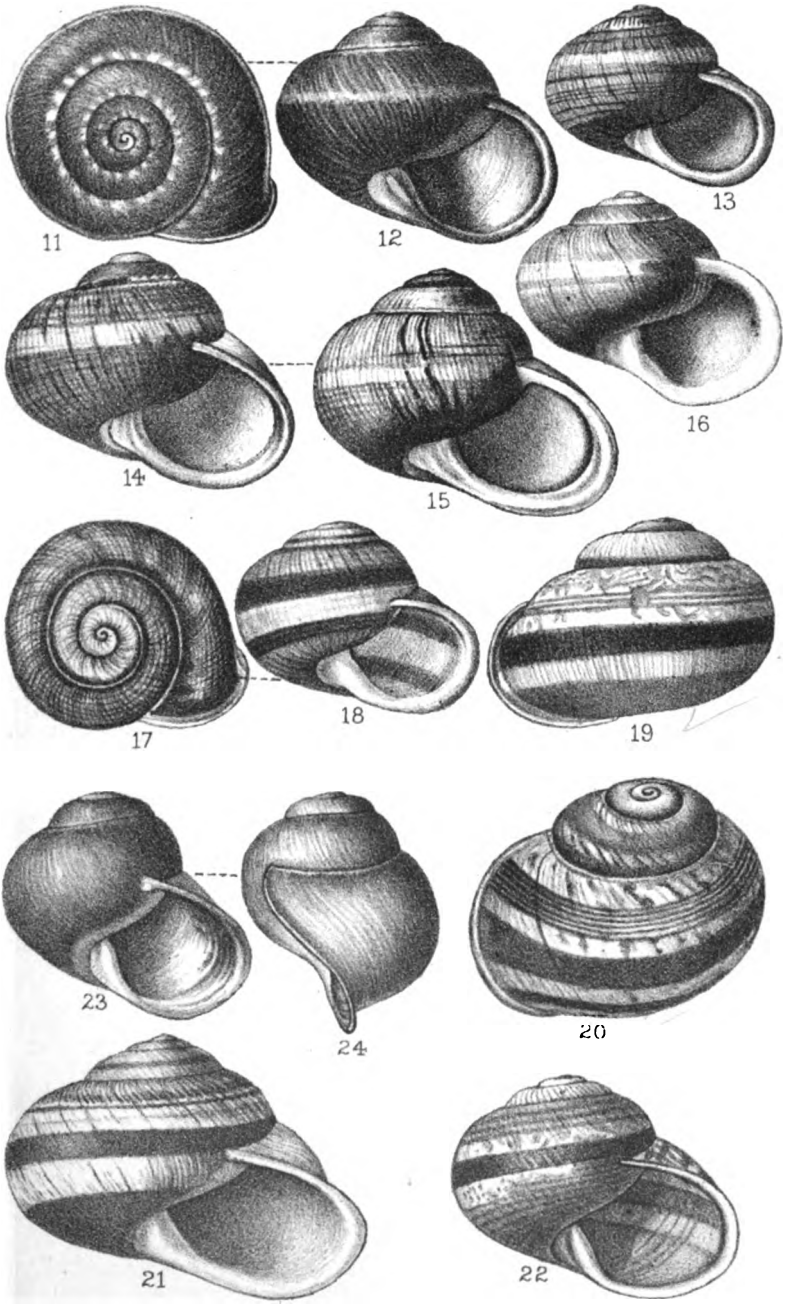

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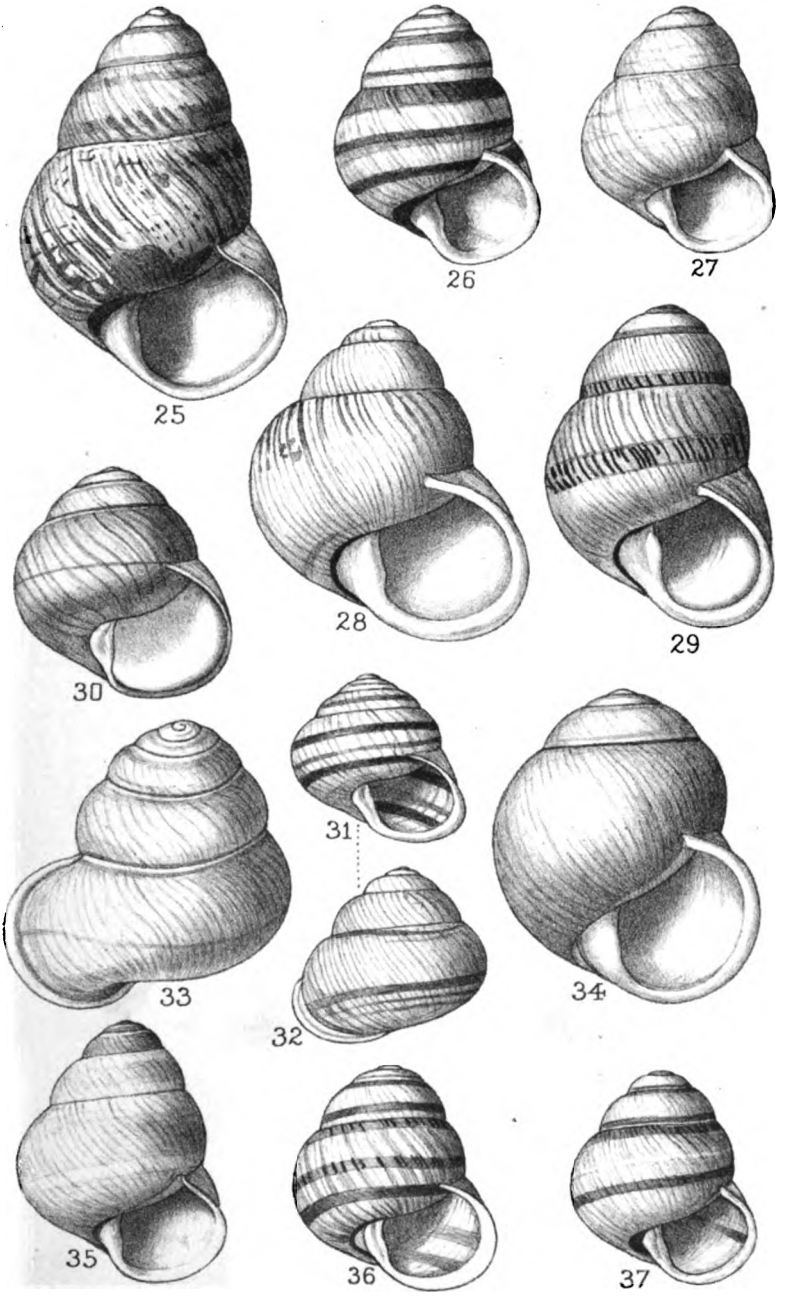

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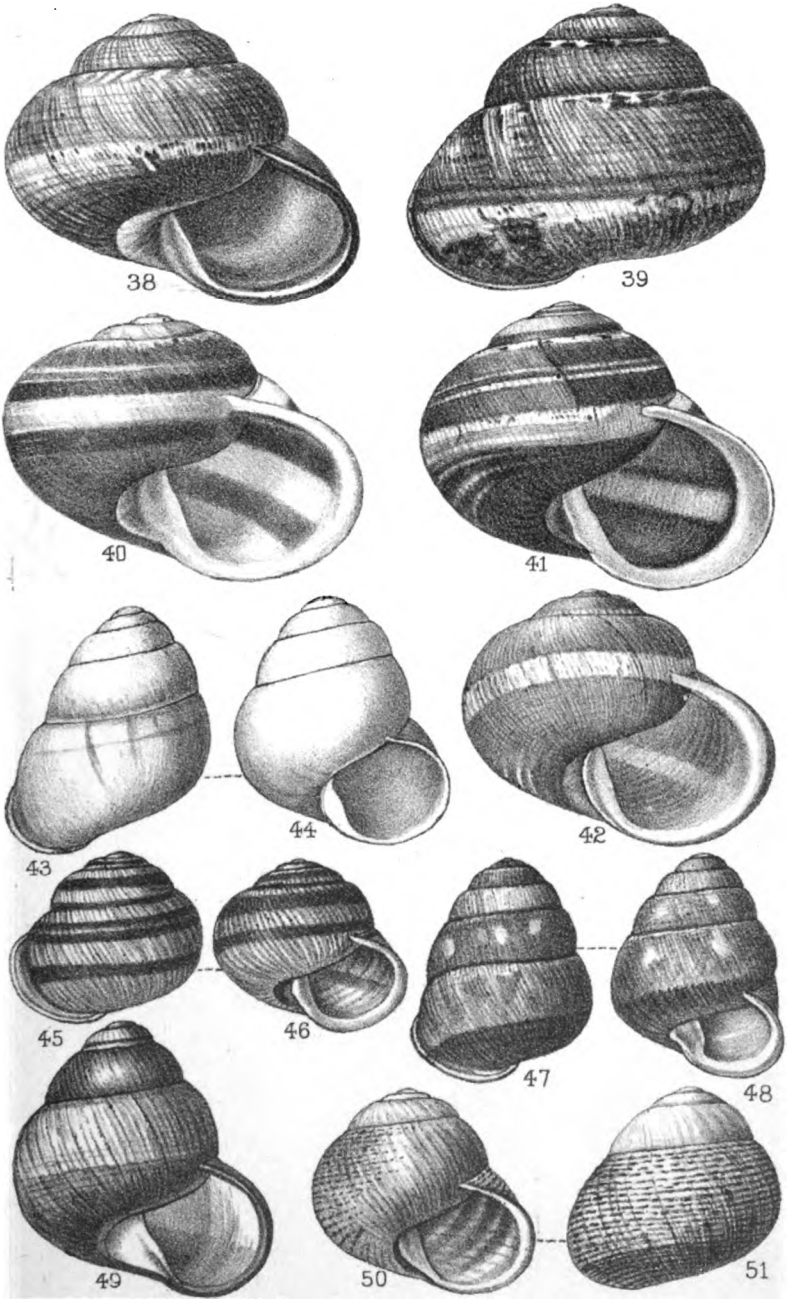

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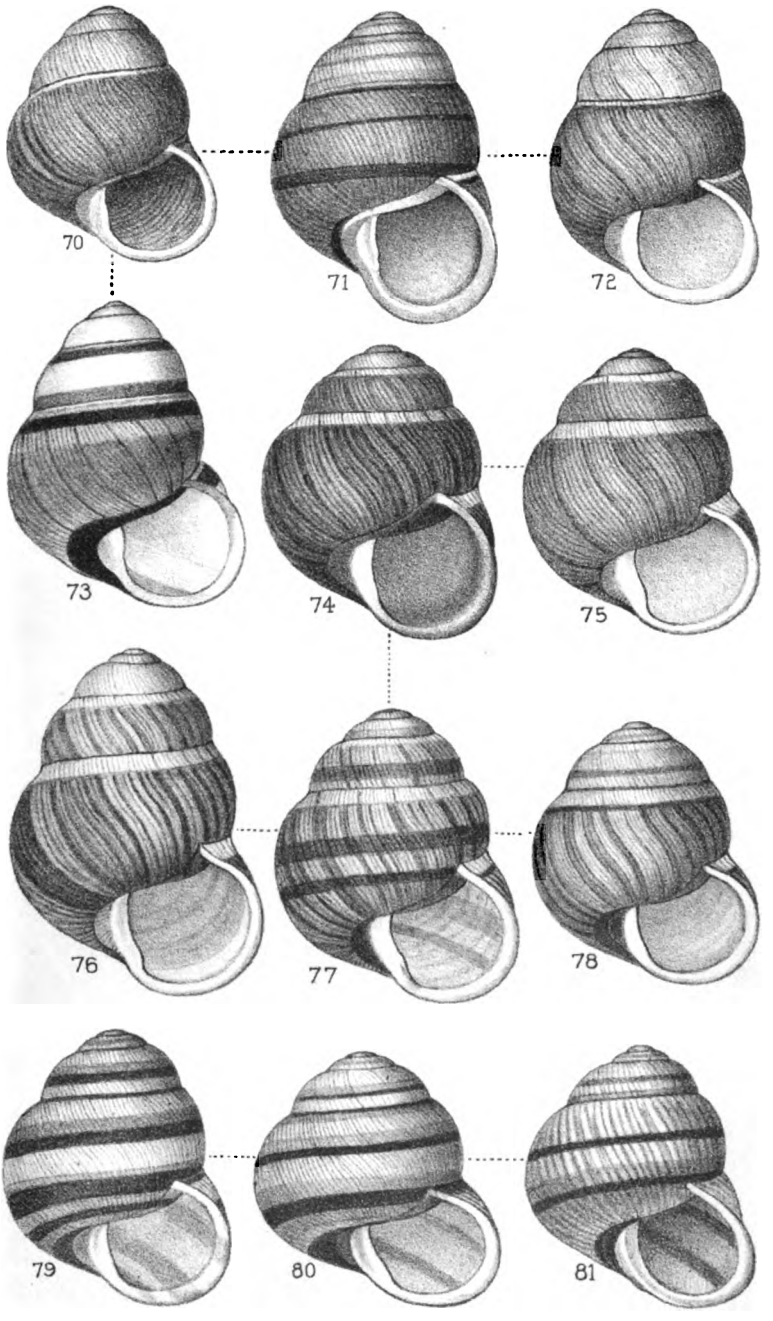

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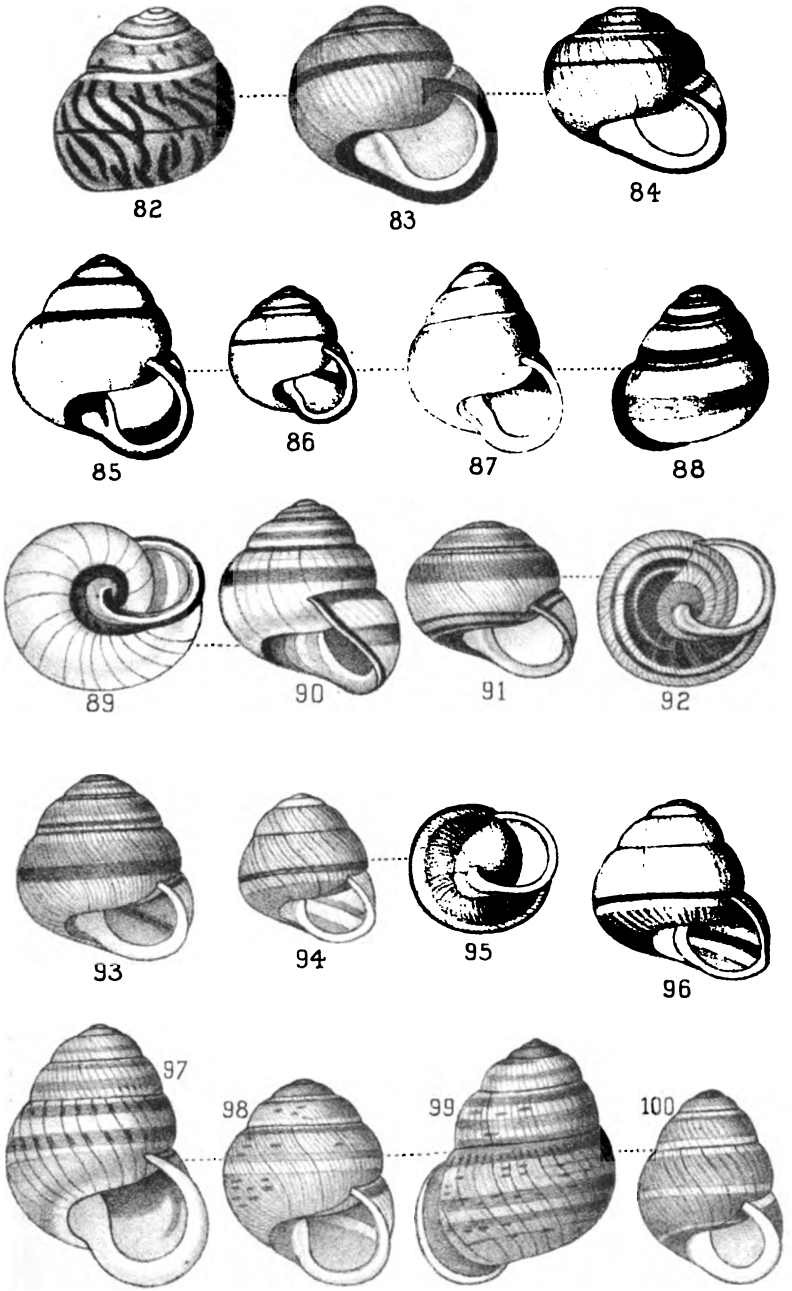

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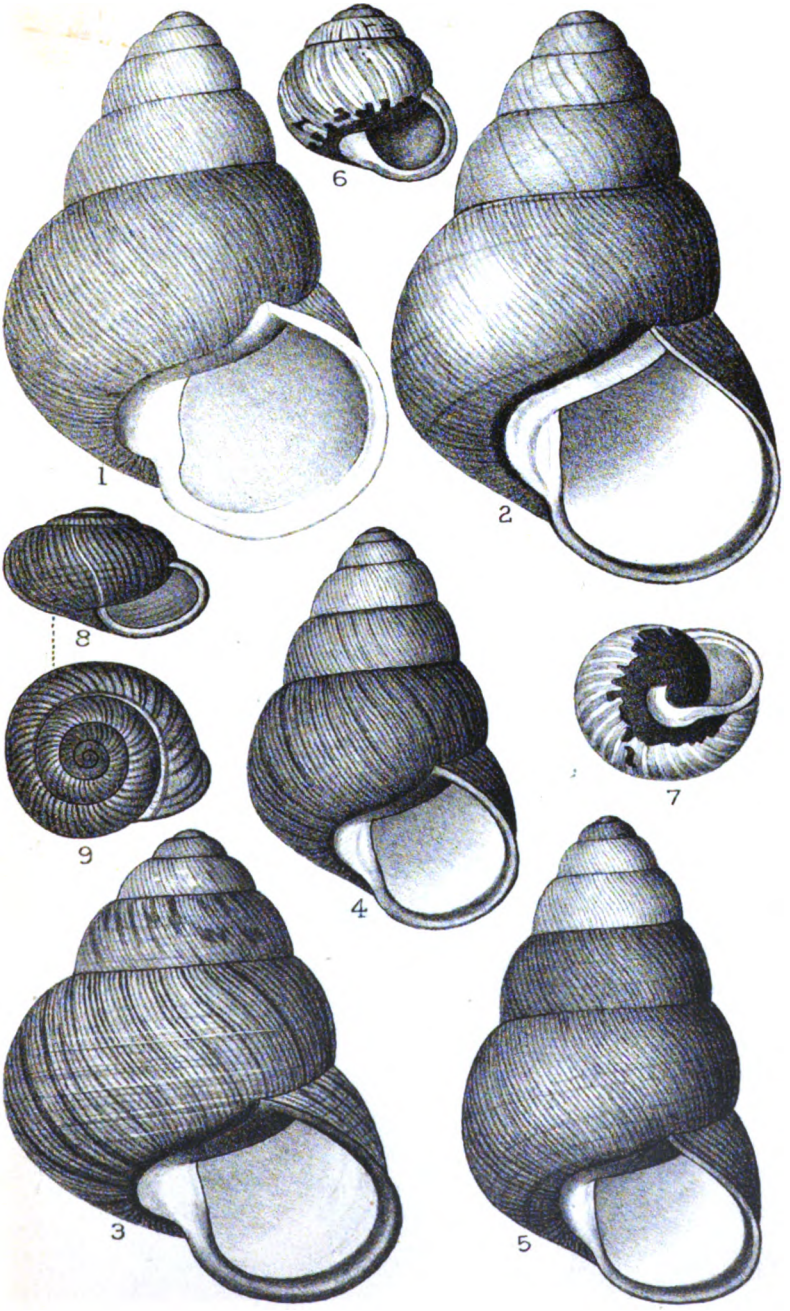

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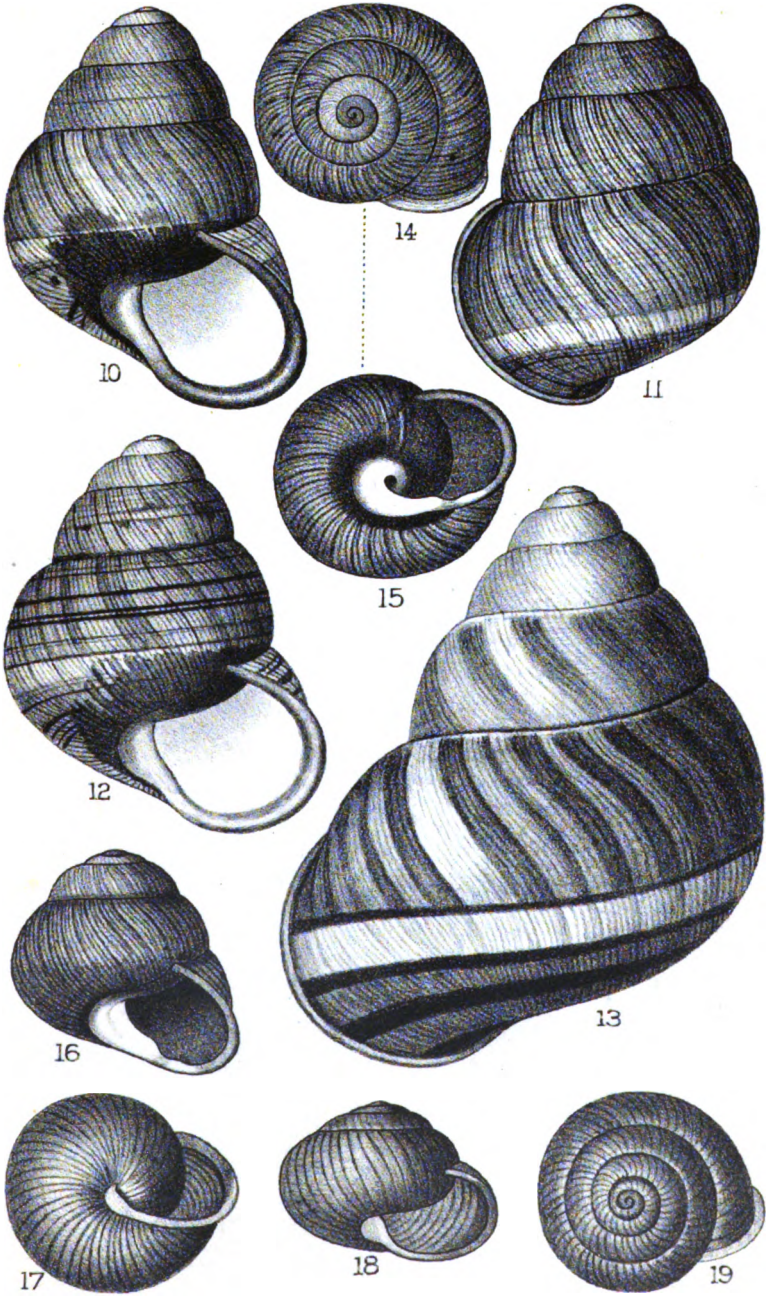

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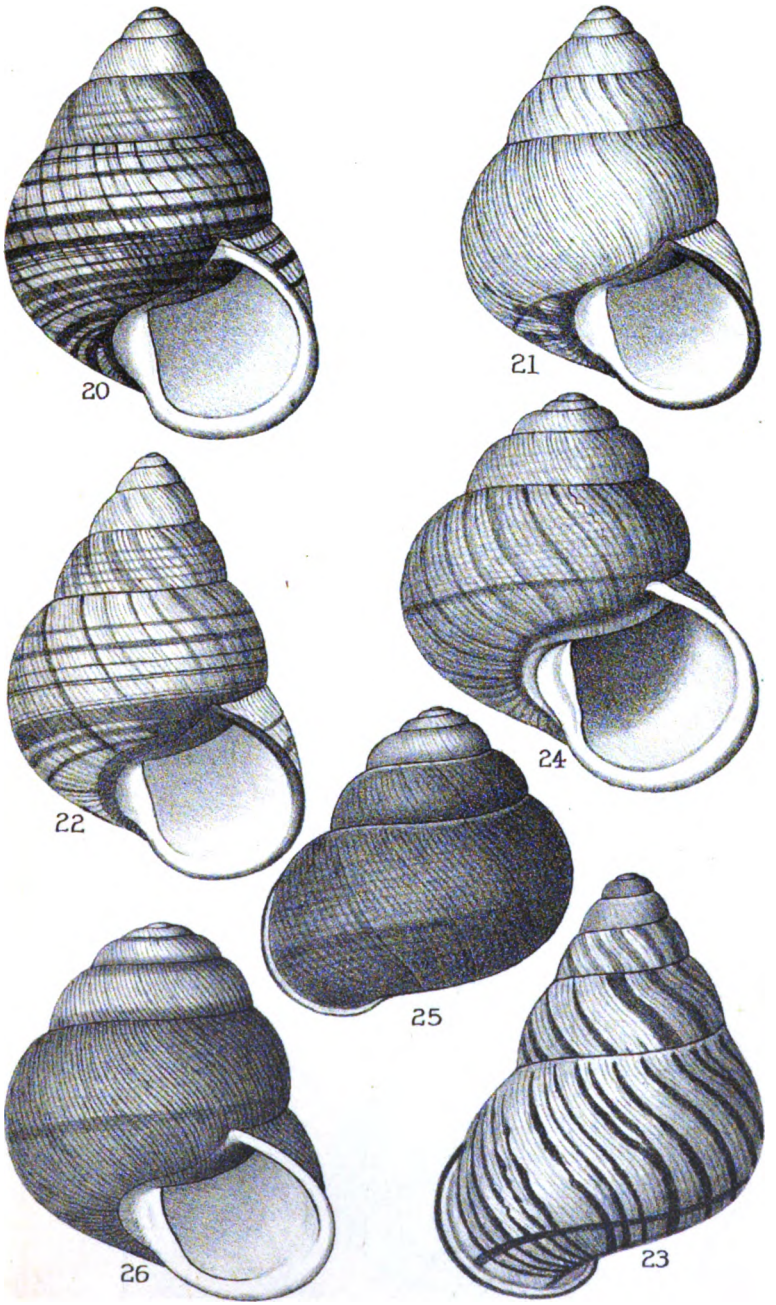

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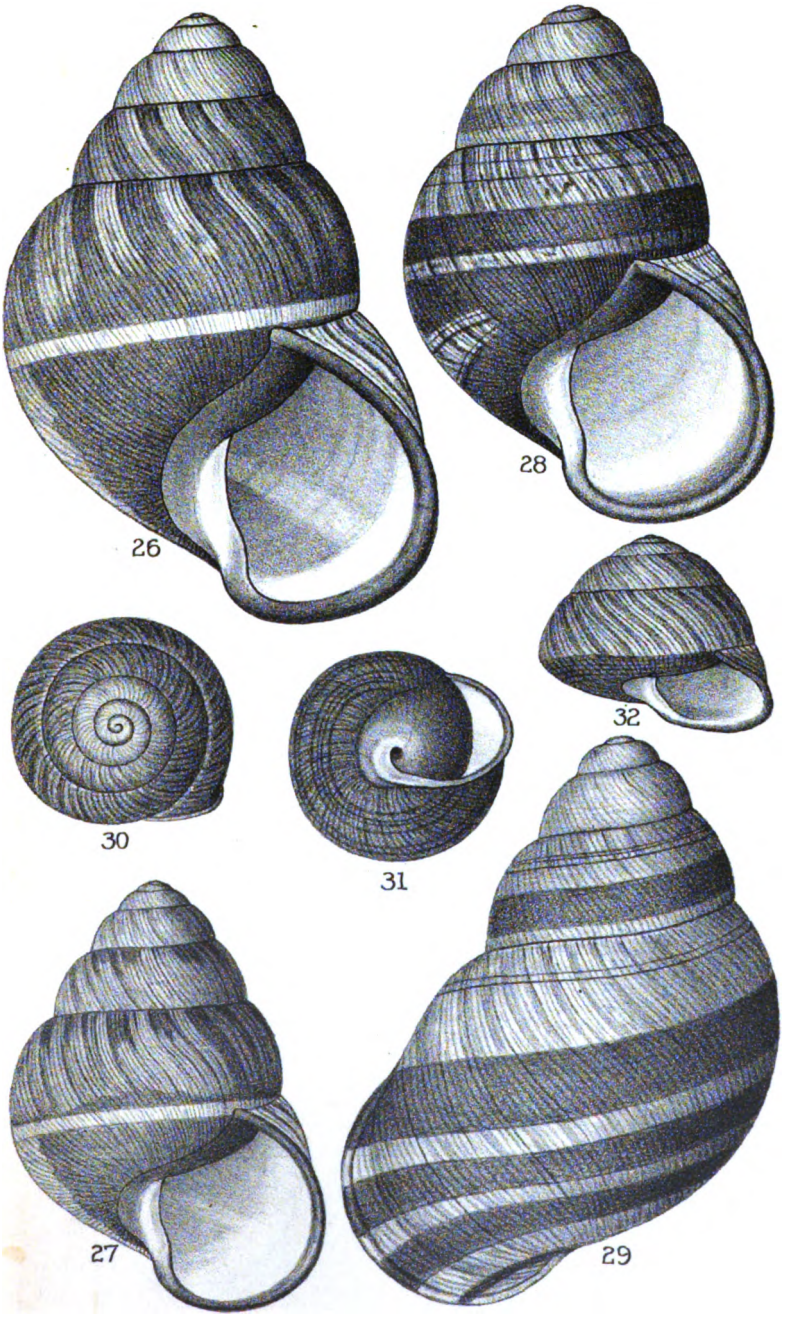

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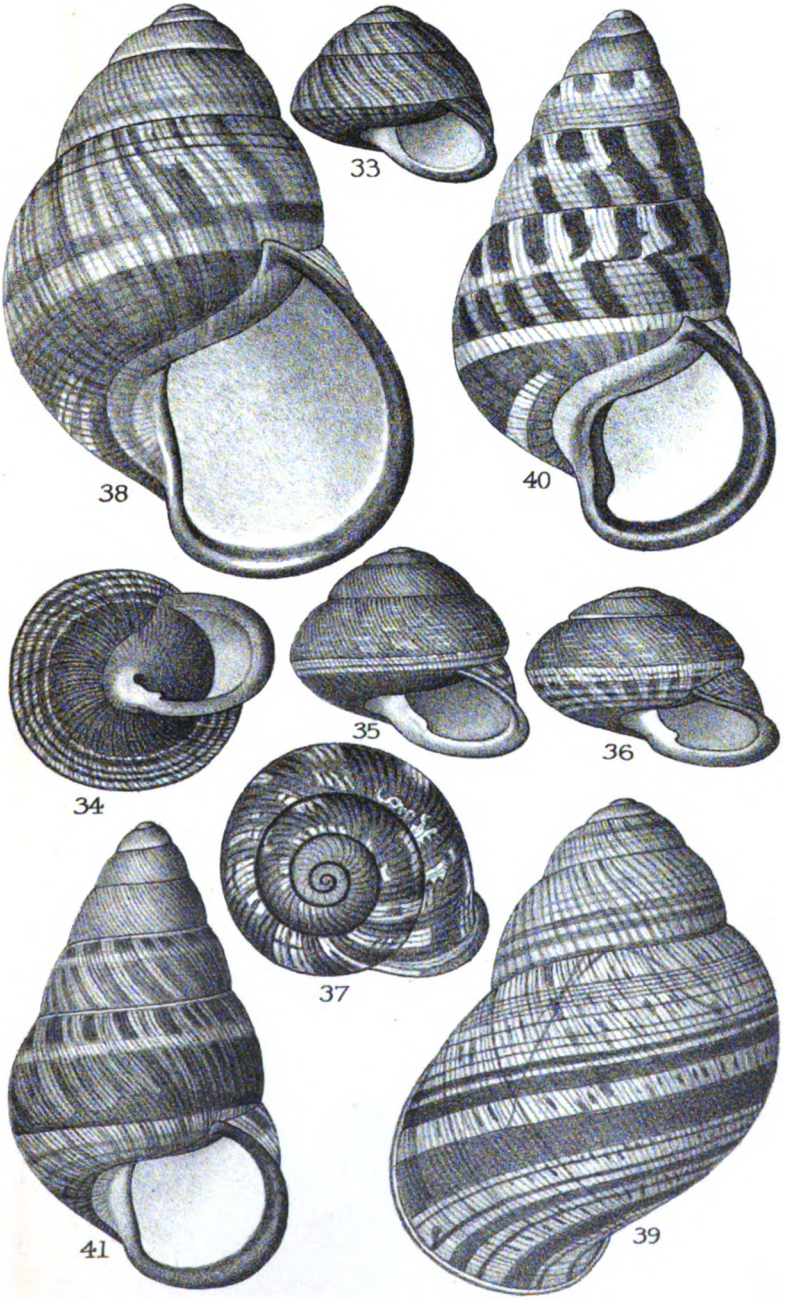

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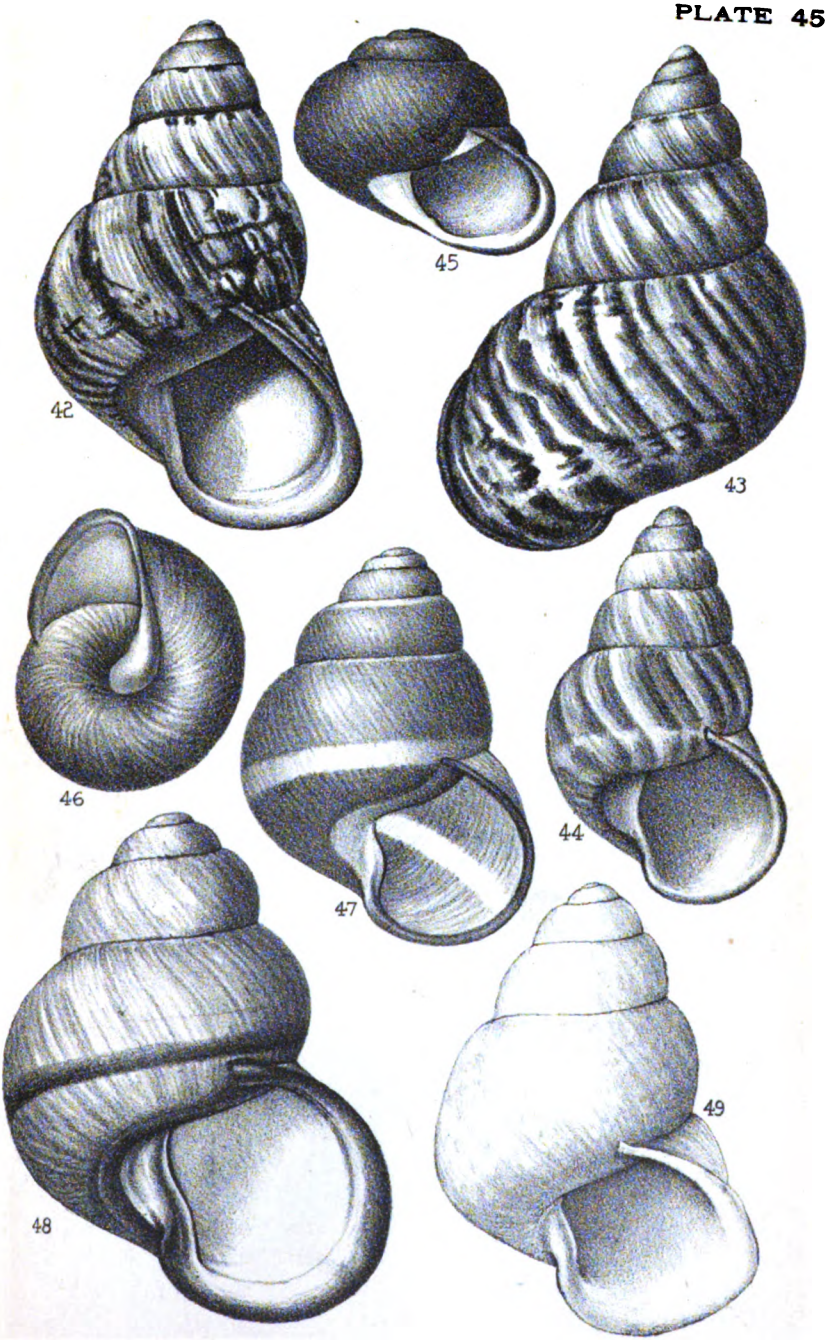

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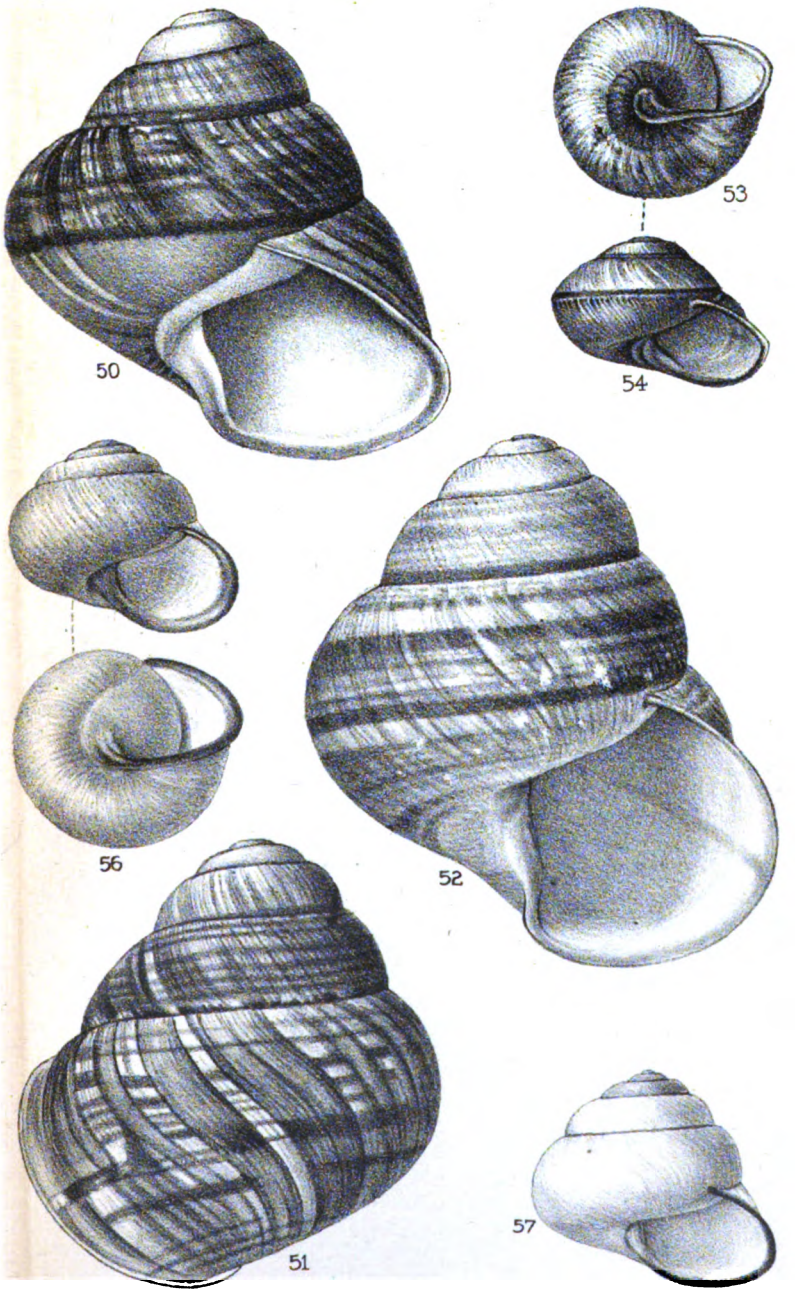

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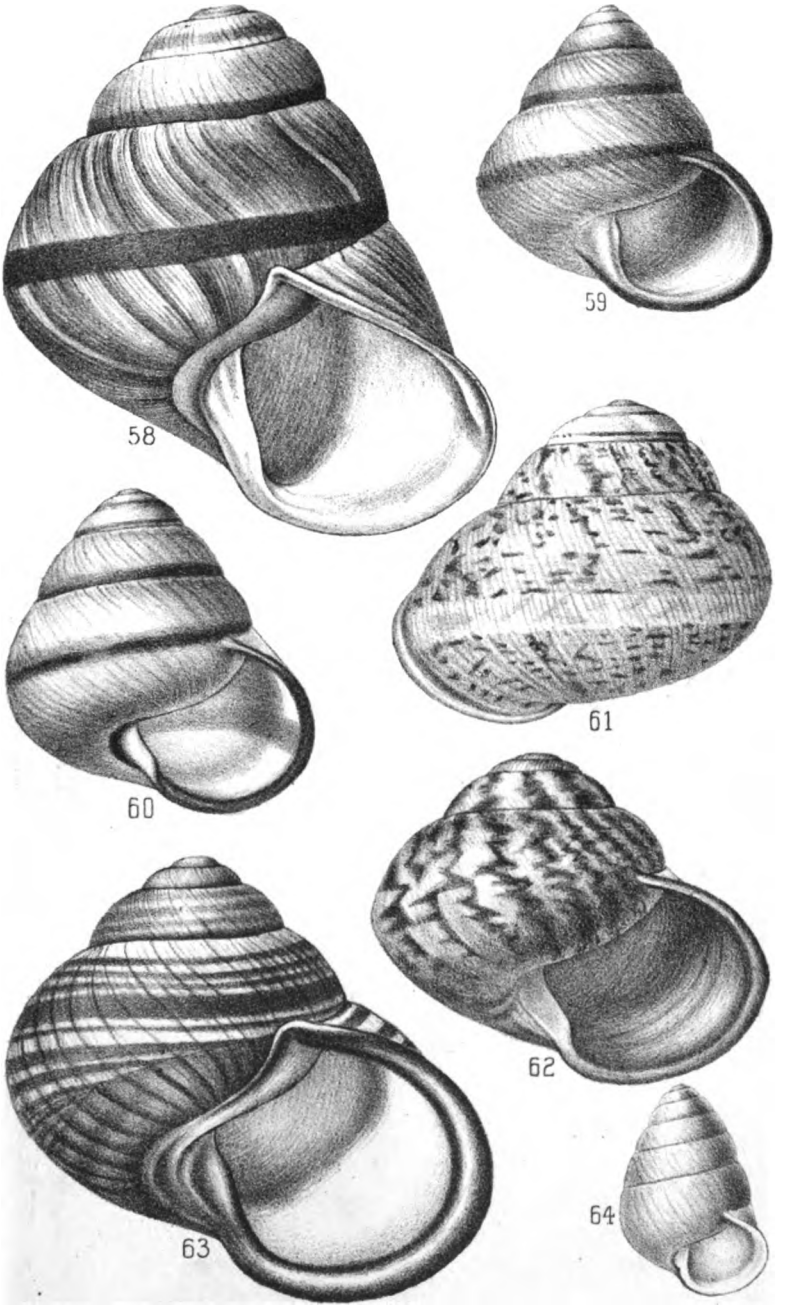

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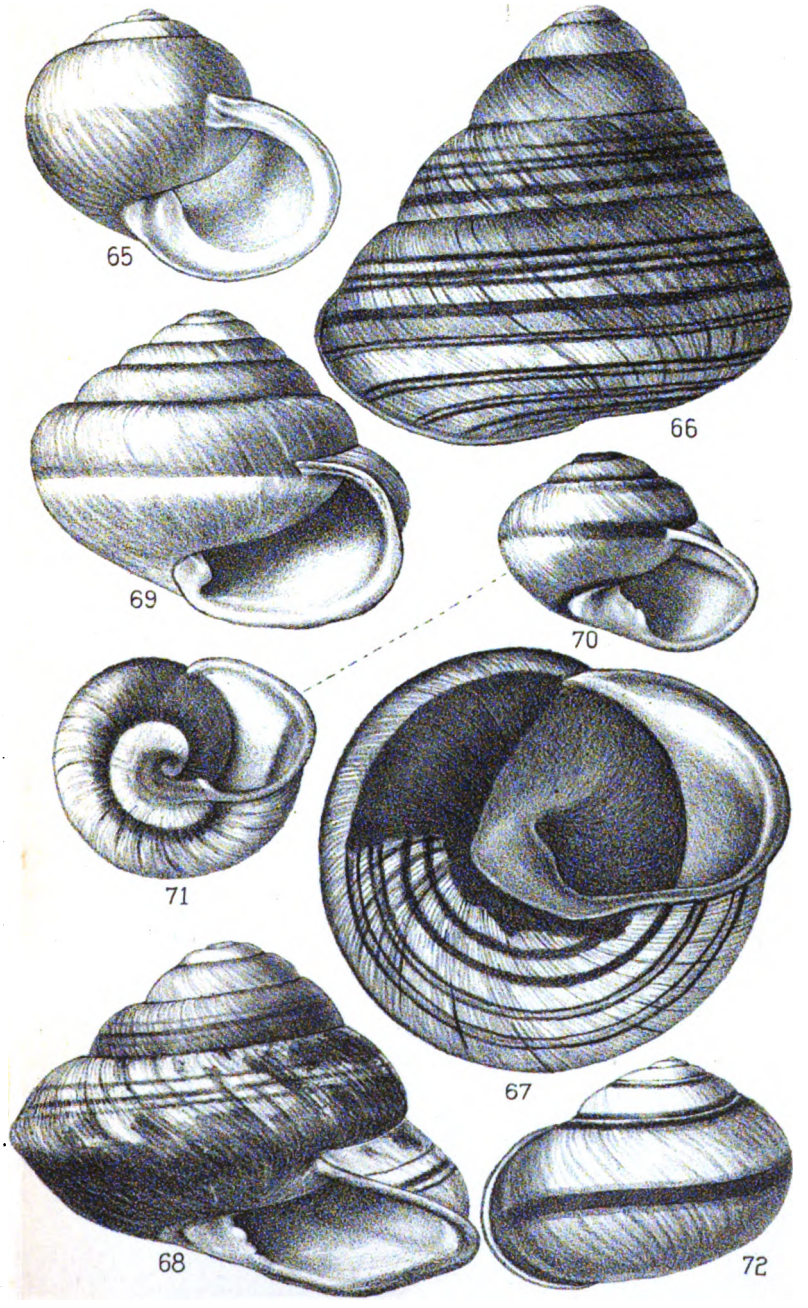

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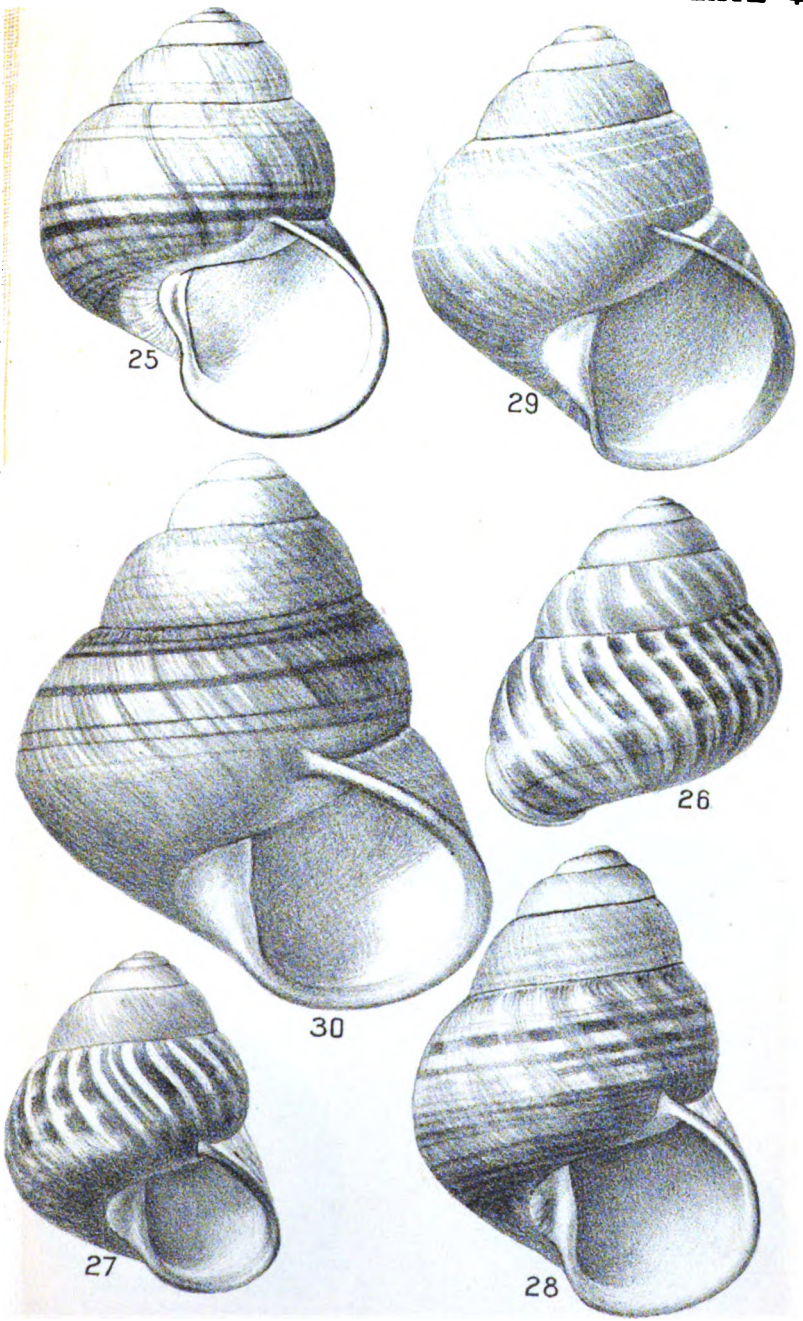

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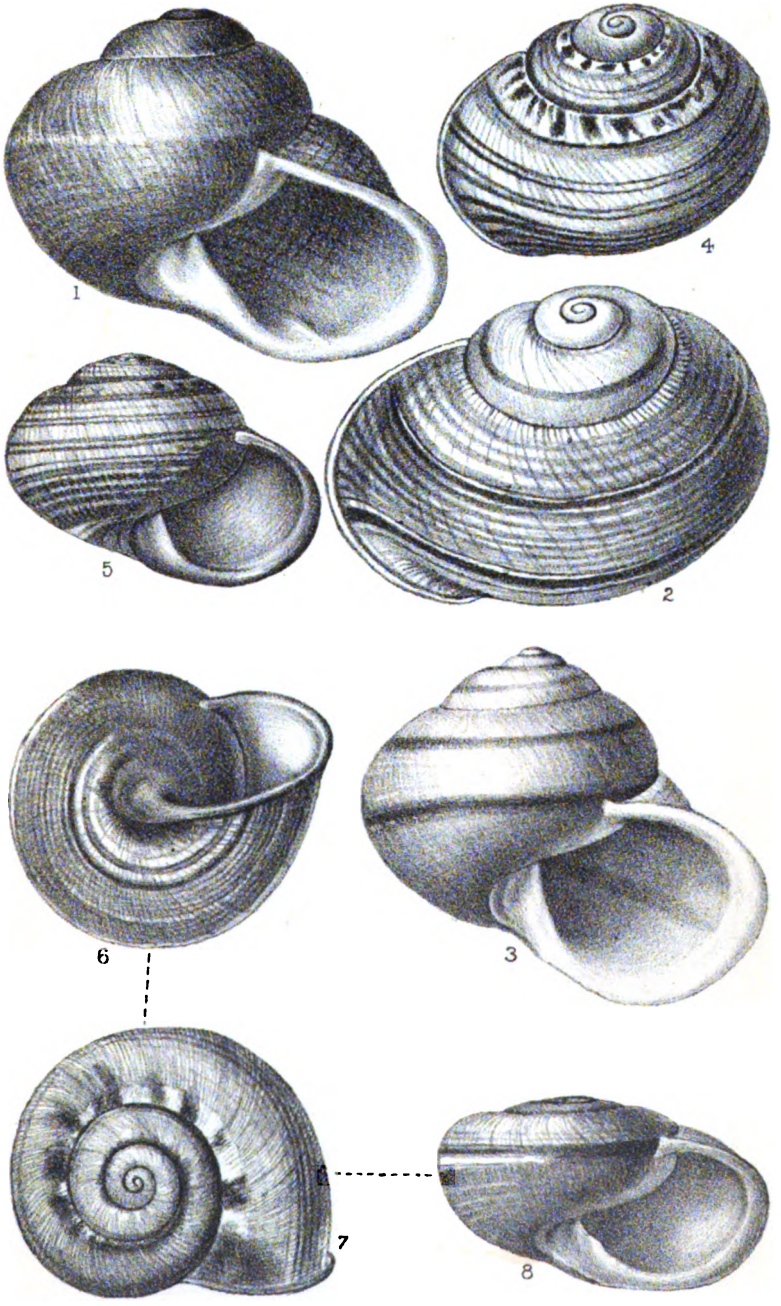

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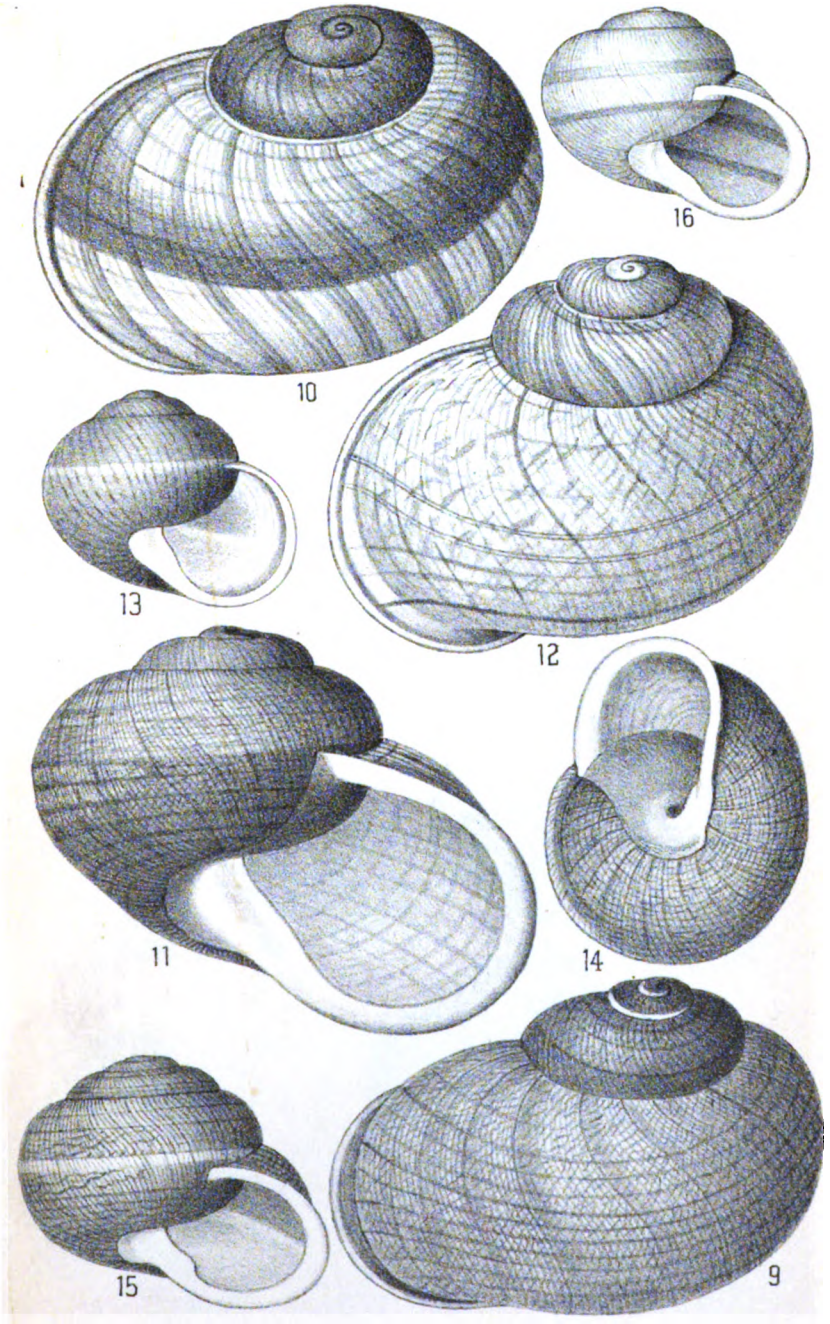

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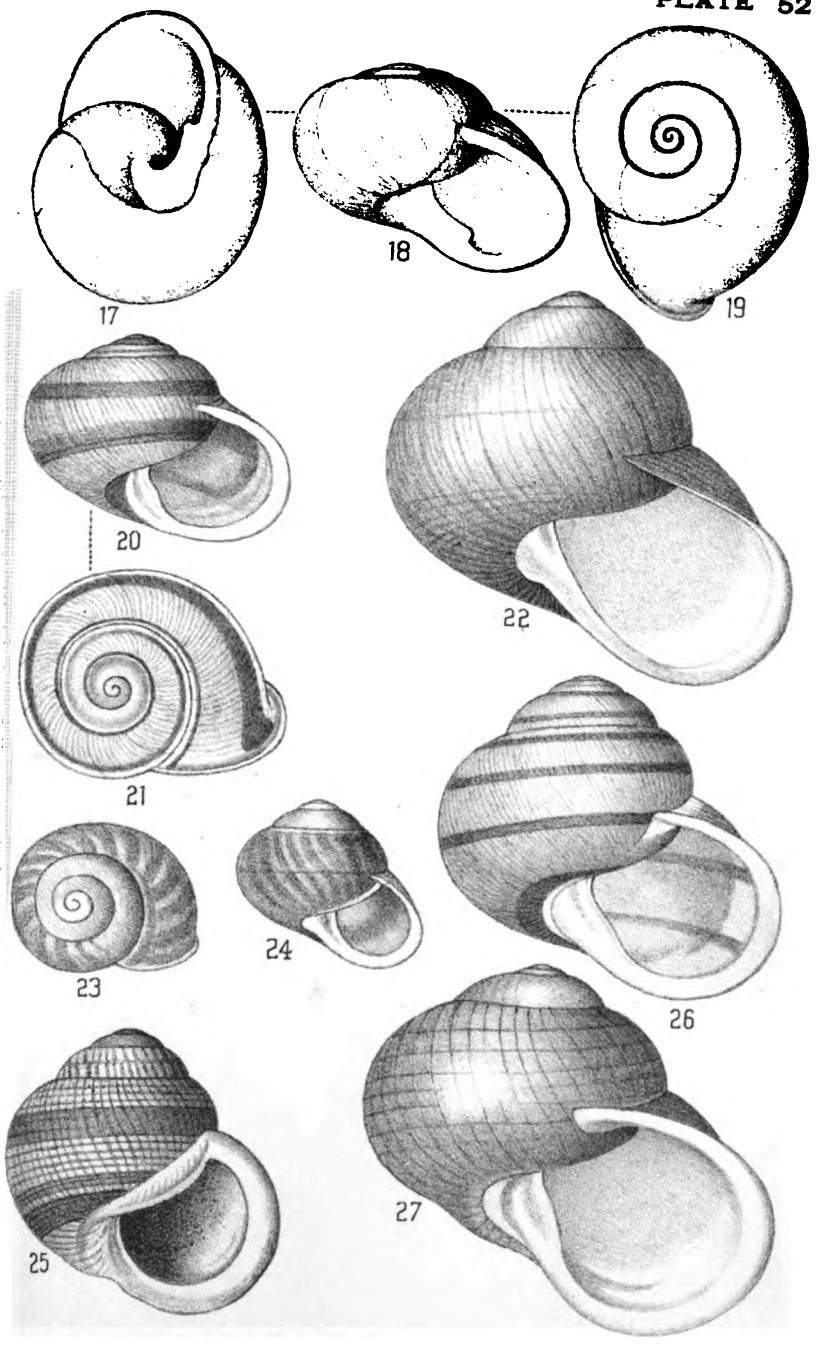

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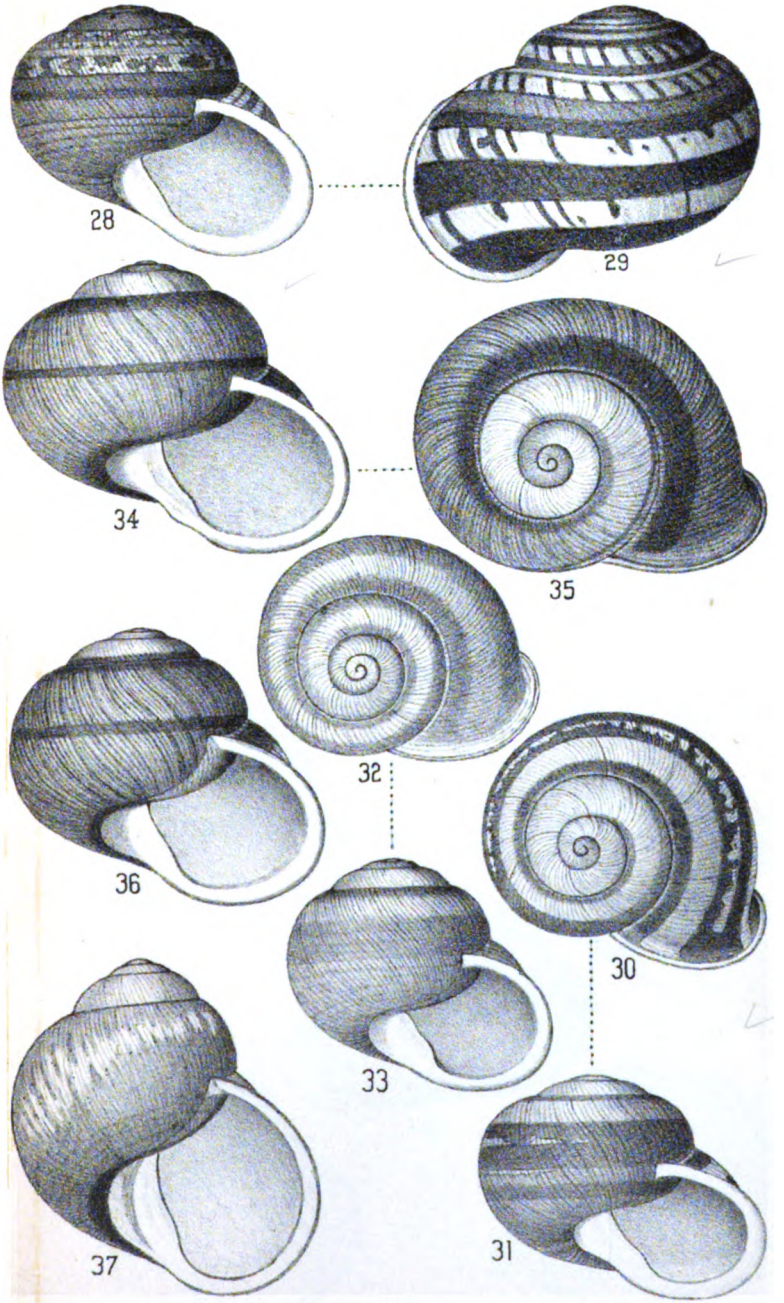

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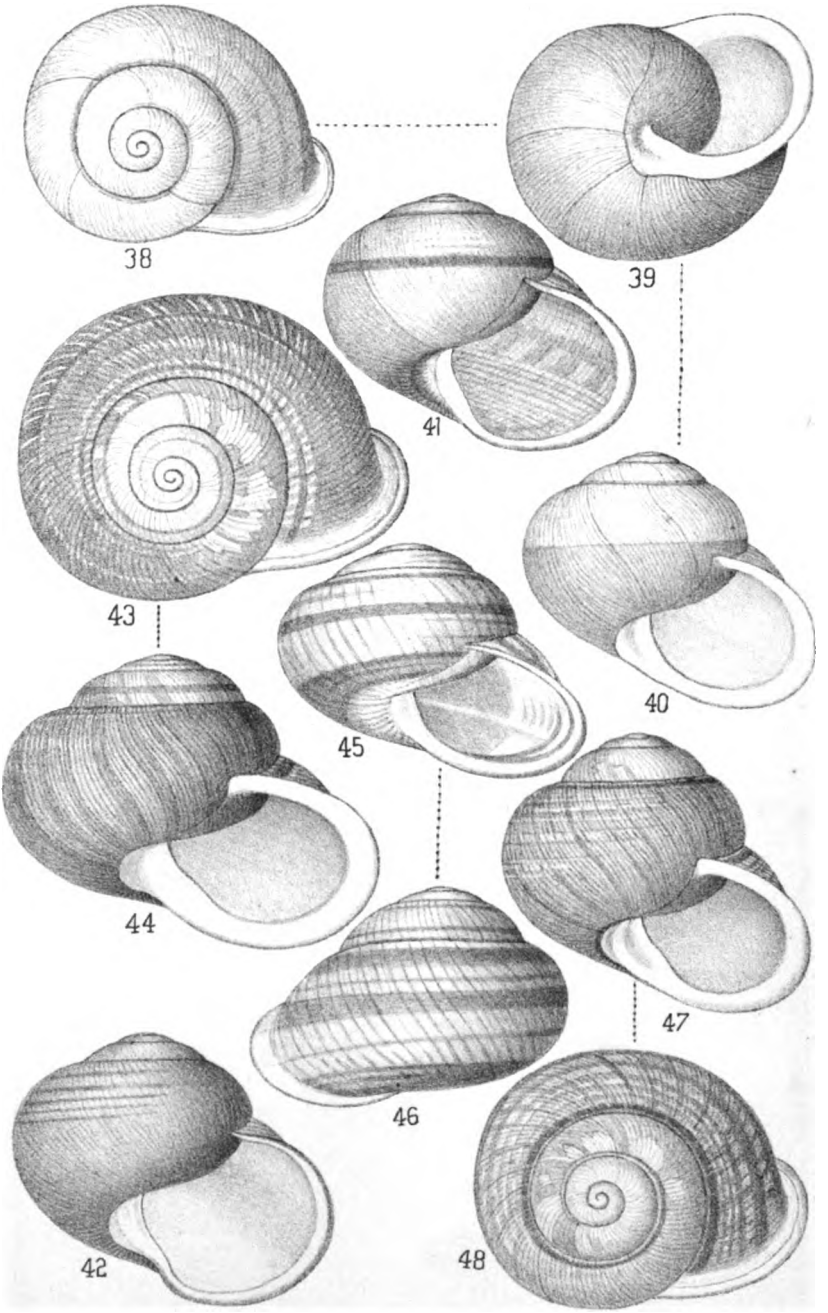

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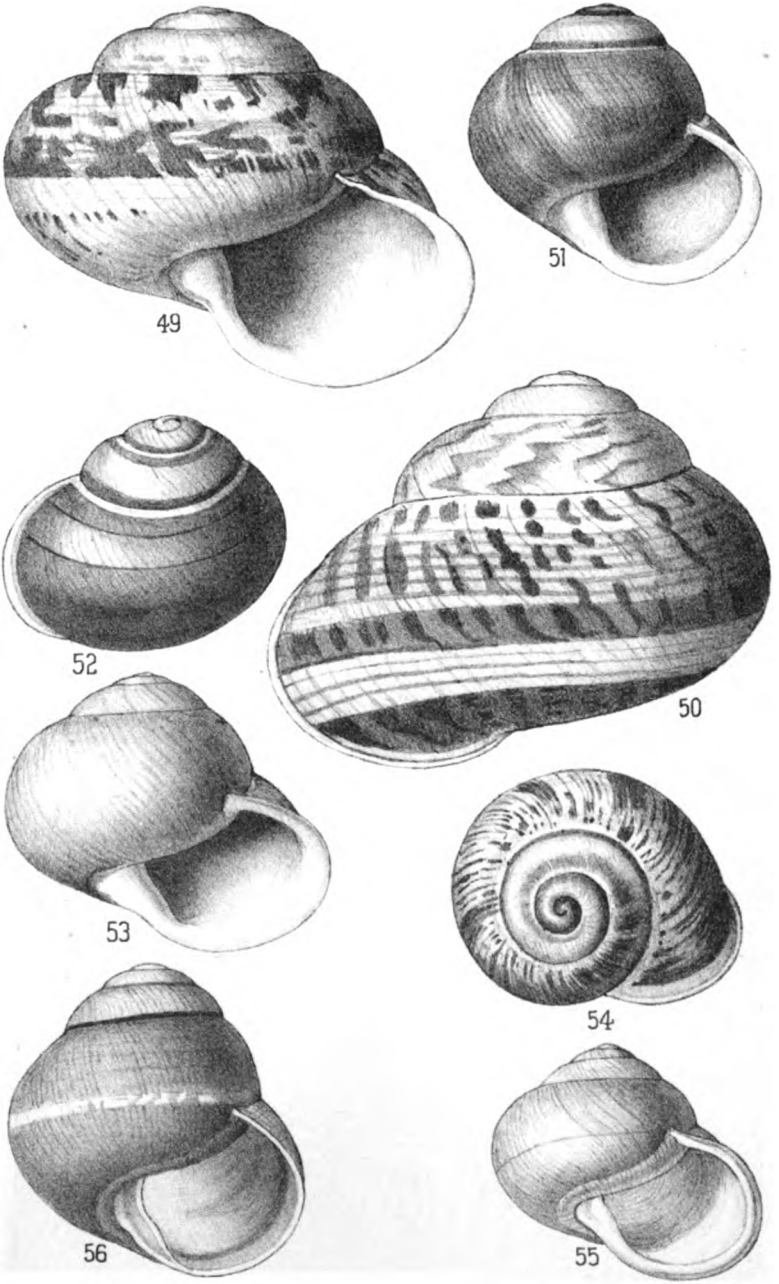

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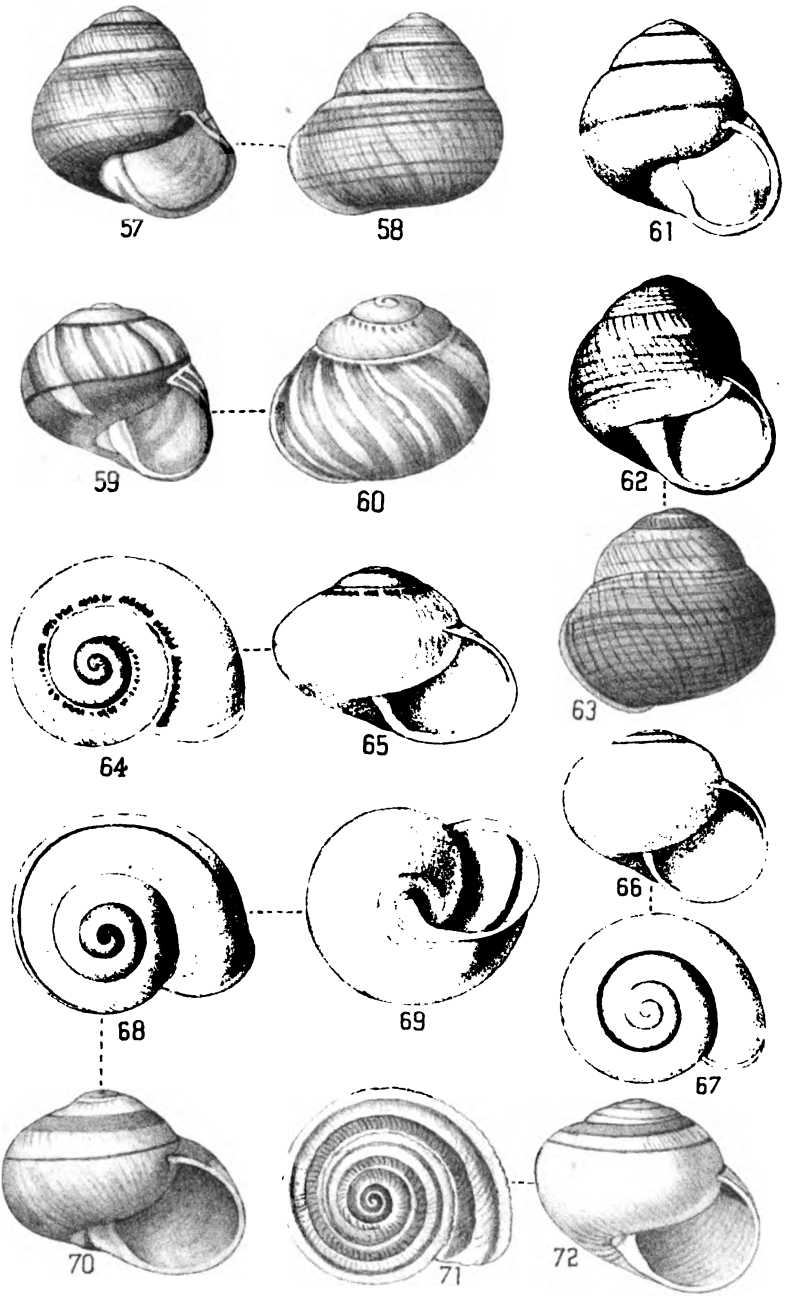

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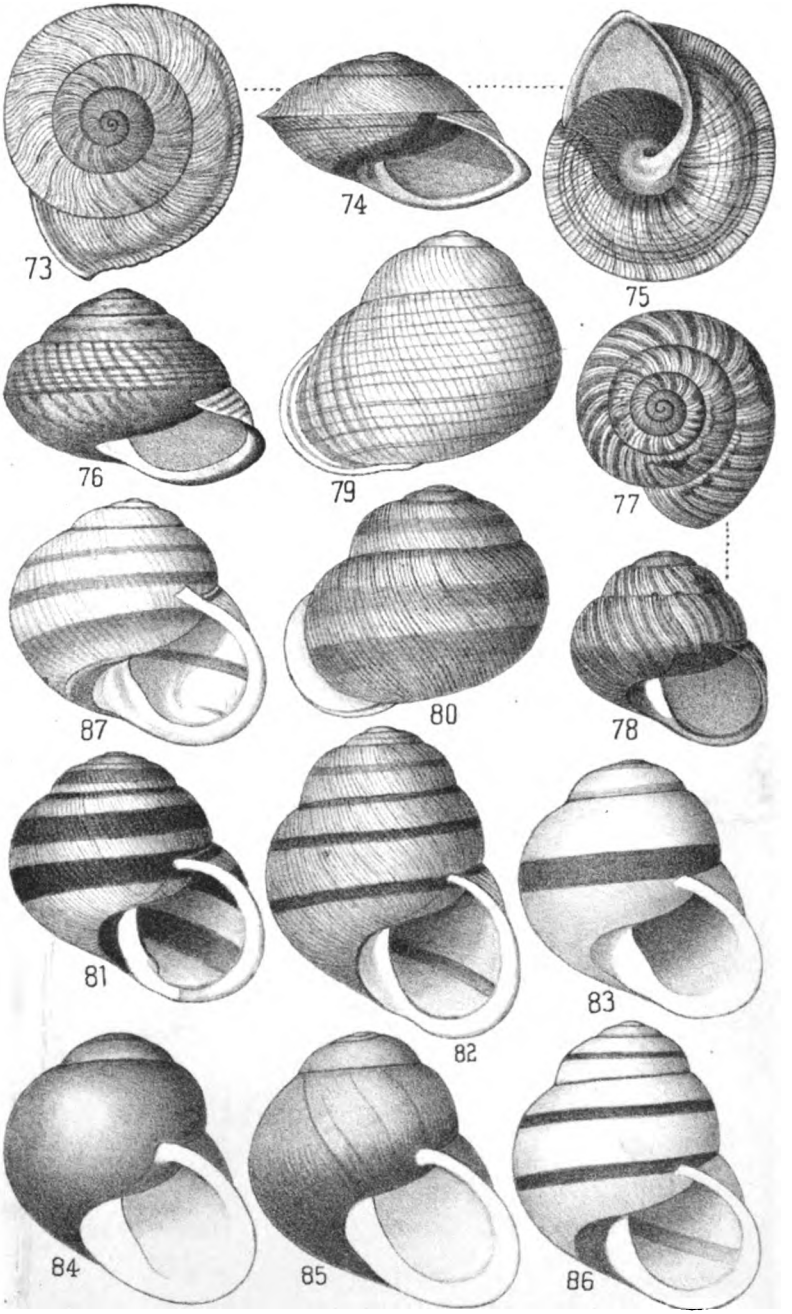

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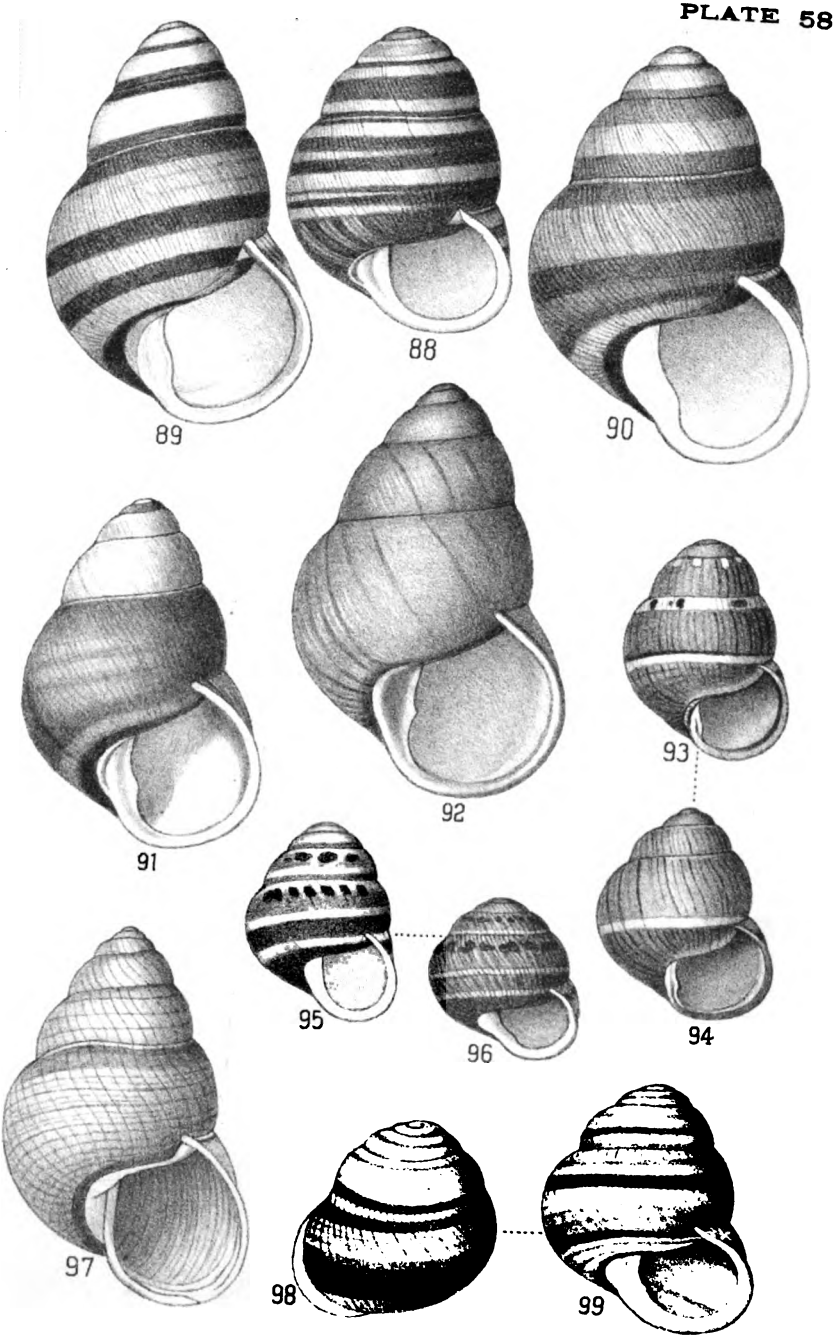

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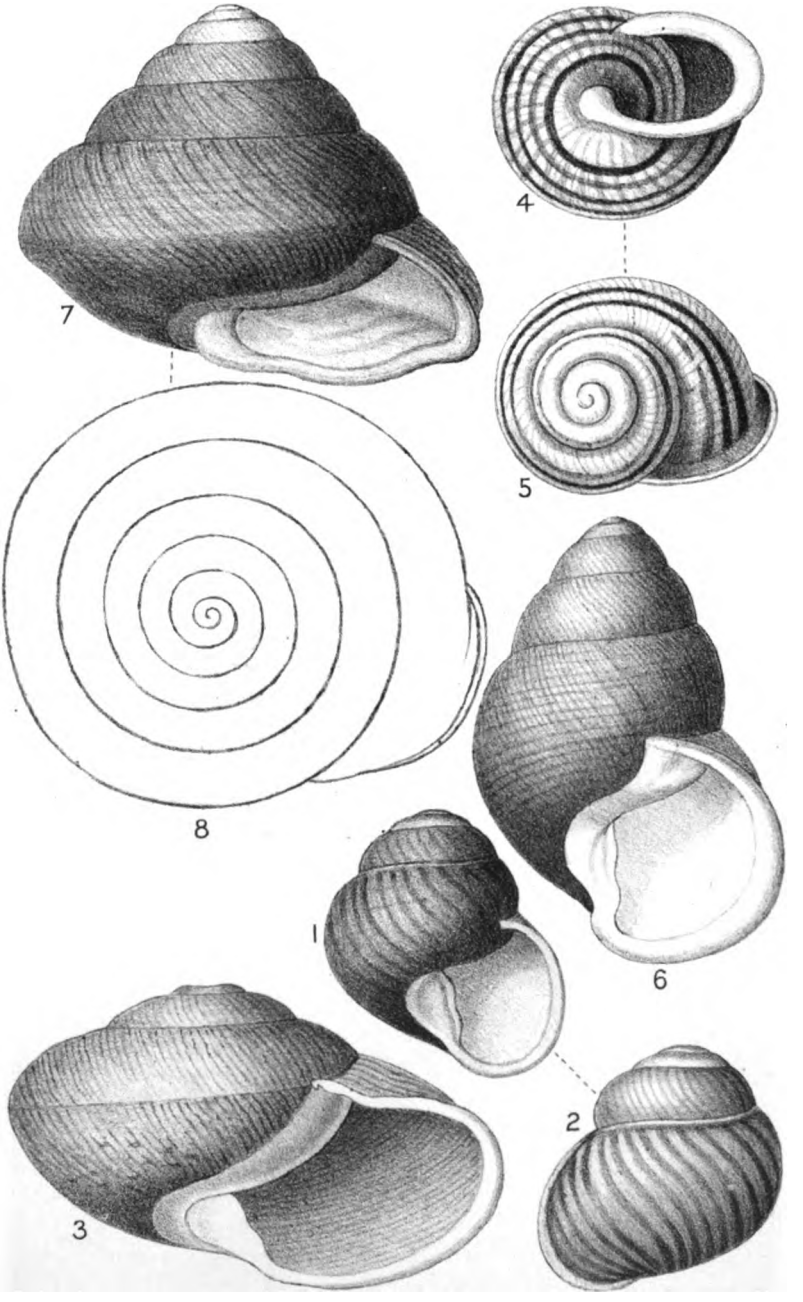

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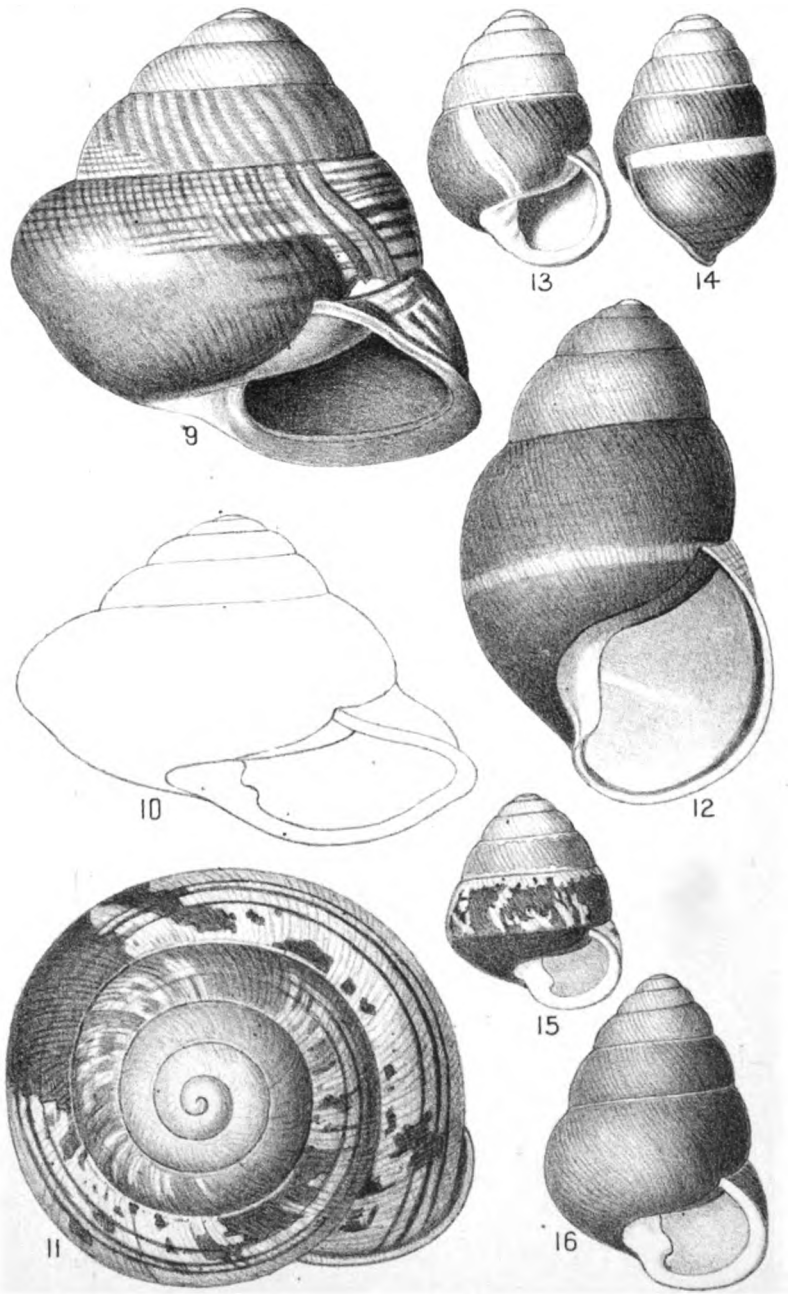

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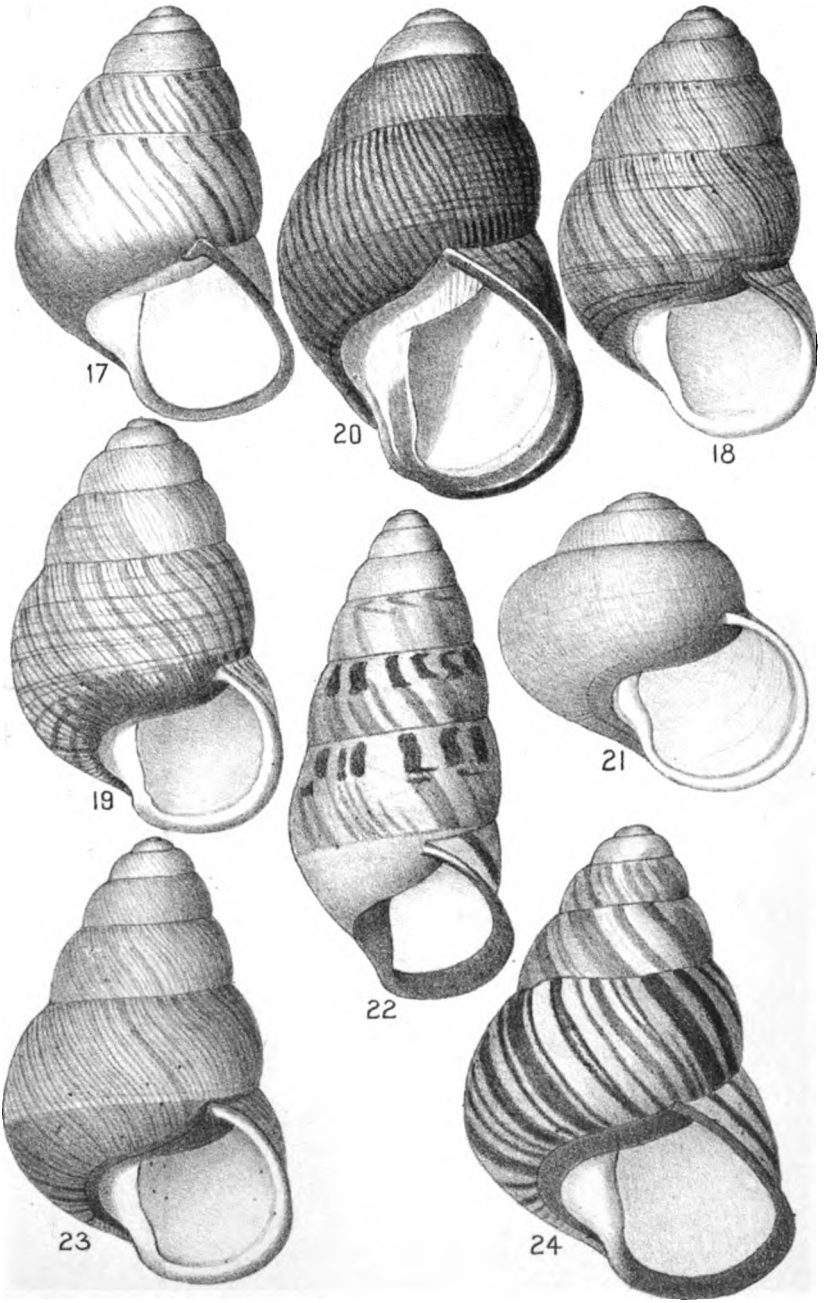

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